

99:7

OCTOBER 1, 1948

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AUTOMOTIVE INDUSTRIES

PASSENGER CARS • MOTOR TRUCKS • BUSES

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Atoms Go to Work for Industry

A Glamorized Volkswagen—The Austrian Porsche

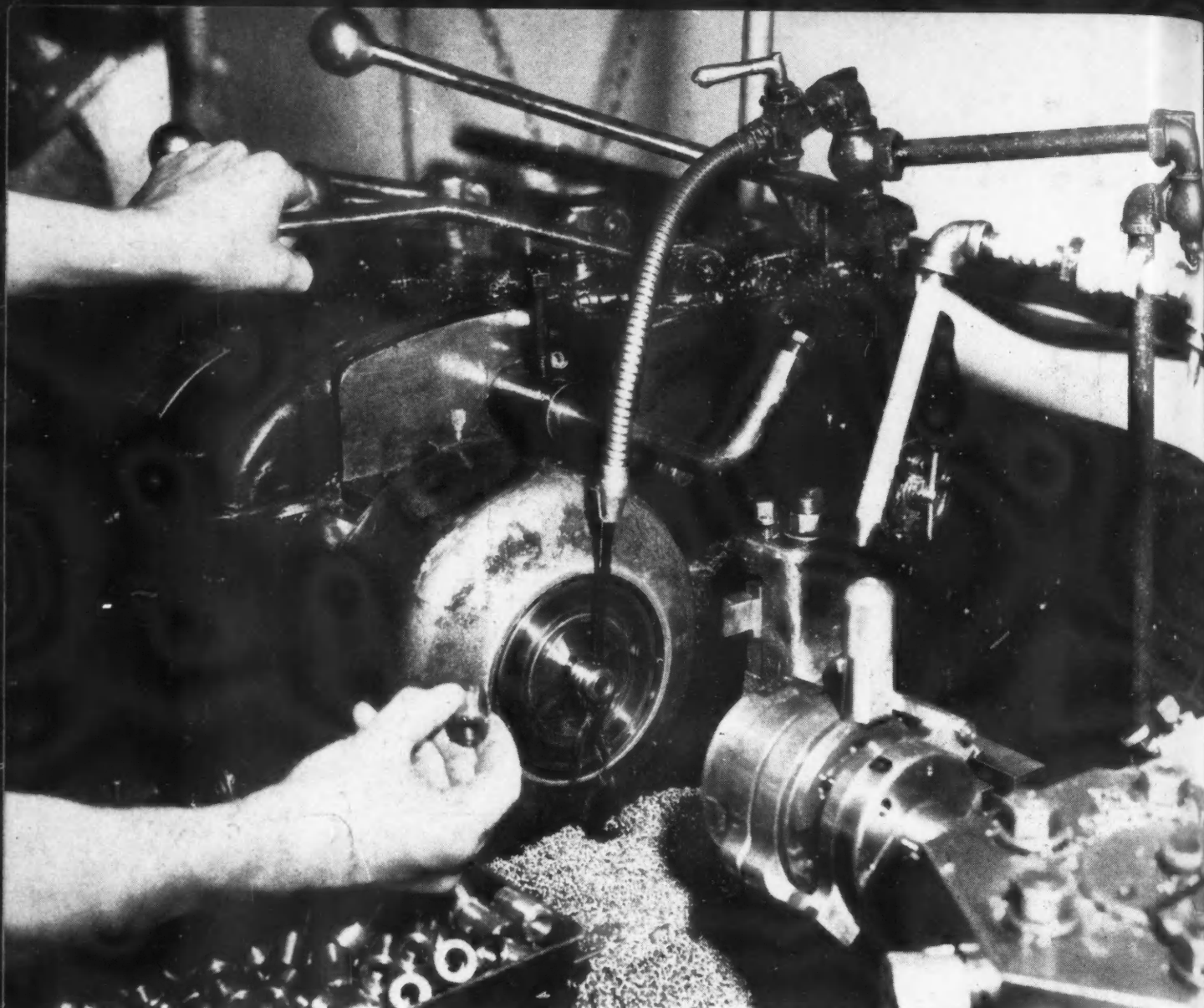
New Dodge 6-Wheel Trucks

High Speed Machining of Large V-8 Blocks

122 Automobile Assembly Plants in 81 Cities of 24 States

Trends in Aircraft Research

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See what a shift in cutting oil did here...

A simple shift to Acme Cutting Oil brought remarkable results at the A. B. Heller Screw Products, Detroit. Production on hand screw machines increased 29% and tool grinding was cut $\frac{1}{3}$. The material machined is 18-8 free-machining stainless steel.

Here is a tabulation of the results:

	Acme Cutting No. 110	Former Oil
R. P. M.	442	350
Surface Speed, ft. per min.	116	90
Depth of Cut, in.	$\frac{3}{16}$	$\frac{3}{16}$
Length of Cut, in.	$\frac{4-7}{16}$	$\frac{4-7}{16}$
Feed per Rev., in.0045	.0045
Pieces Per Hour	18	14
Pieces Per Tool Grind	155 pcs.	48 pcs.
Finish	Very smooth	Fair

This change in cutting oil was made after the job was discussed with a

Standard Cutting Oil Engineer. Perhaps one of these engineers can bring equally good or greater savings to your machining operations. If your plant is located in the Middle West, write Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Ill., for the engineer nearest you.

ACME CUTTING OIL

STANDARD OIL COMPANY (INDIANA)



AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

October 1, 1948

Vol. 99, No. 7

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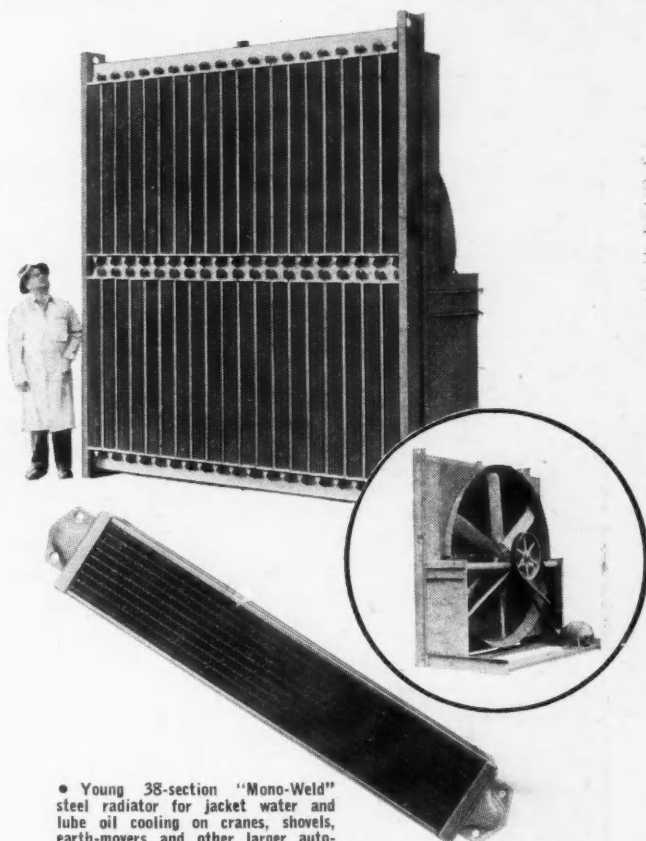
Cable AddressAutoland, Philadelphia

Member: Audit Bureau of Circulations; Associated Business Papers, Inc.
AUTOMOTIVE INDUSTRIES is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

AUTOMOTIVE INDUSTRIES, October 1, 1948

"MONO-WELD" SECTIONAL RADIATORS BY YOUNG

For Larger Automotive Applications



• Young 38-section "Mono-Weld" steel radiator for jacket water and lube oil cooling on cranes, shovels, earth-movers and other larger automotive applications. Inset shows sturdy frame (for stationary or skid mounting), shroud, and adjustable pitch fan.

• Here's a radiator that can cool larger internal combustion engines, yet has many of the advantages of a smaller unit. This "Mono-Weld" unit has removable core sections and can be used for direct atmospheric oil and jacket water cooling or with an oil cooling heat exchanger. Eight sizes dissipate from 600,000 to 5,000,000 Btu per hr under standard conditions of air and water temperatures. High air delivery required for these ratings is provided by a Young pusher or puller type aluminum fan. This six-blade fan with adjustable pitch has low horsepower consumption. "Mono-Weld" units are of rigid construction with individual core sections providing easier servicing. Get efficient cooling from "Mono-Weld" Radiators by Young.

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HEAT TRANSFER PRODUCTS



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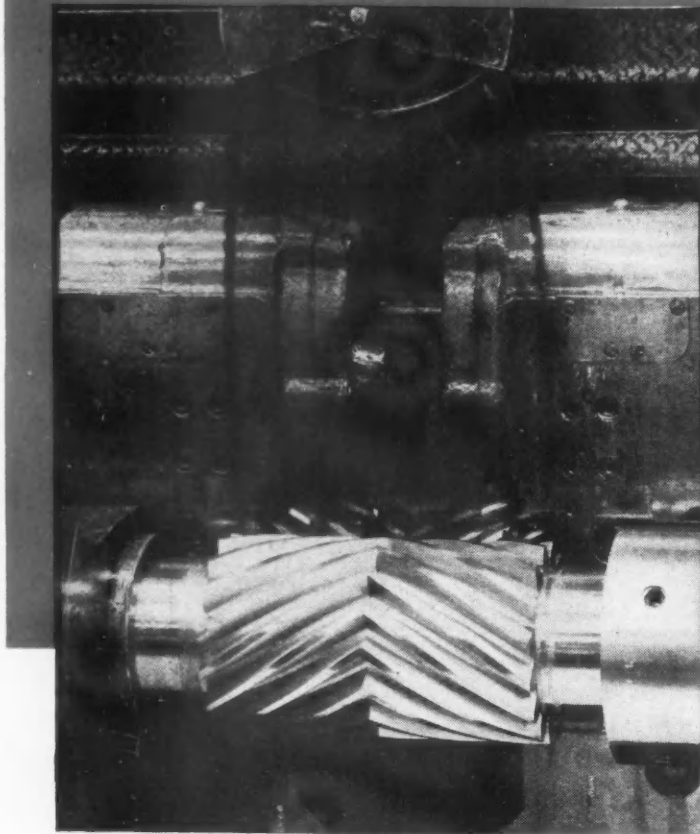
AUTOMOTIVE AND INDUSTRIAL PRODUCTS

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cutting coolants
assure faster work,
fewer tool grinds,
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Texaco Cleartex and Transultex Cutting Oils are transparent . . . permit machine operators to watch the cutting tool through the oil film — an important factor in faster work.

To machine better, faster, at lower cost, use the *right* cutting fluid *right*. That means, use Texaco. For Texaco has the proper cutting coolants . . . and the practical Lubrication Engineering Service . . . to assure you best results on every job.

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Send for this 48-page, illustrated book: "Lubricants and Coolants for Cutting and Grinding." It describes the complete line of Texaco cutting fluids, contains much practical, cost-saving data on handling and using them for all types of machining.



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AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

Atoms Go to Work for Industry

Because of growing interest in this field, starting in this issue **AUTOMOTIVE INDUSTRIES** is publishing two articles that give a complete picture of the industrial application of isotopes. Their production, procedure for procuring, and their distribution to date are dealt with in the extended article on page 24.

Dodge Presents Its New Six-Wheel Trucks

The new Dodge six-wheel truck series features a tandem drive rear axle arrangement of unique type. Details of a torque divider manually selective to meet varying load and road conditions is among other interesting items amplified and illustrated on pages 30 and 31.

High Speed Machining of Large V-8 Cylinder Blocks

Current trend to self-contained transfer type machinery with automatic cycles is well exemplified in the new Lincoln machine shop. Elimination of batteries of former separate machines in Lincoln's present compact set-up is the subject of the article starting on page 32.

The Austrian Porsche, a Glamorized Volkswagen

Dr. Ferdinand Porsche, for forty years designer of passenger cars in Europe, is manufacturing a lightweight car bearing his name, at Gmund, Austria. Details of this spacious streamlined two-seater sports car and plans for a production model coupe are told on page 44.

Austin Adopts American Styling

New Austin models to be introduced at the Paris Salon and the London show include the A-90 Atlantic all-steel convertible with electrically operated top which is obviously designed for the American market. Other interesting Austin style side-lights appear on page 45.

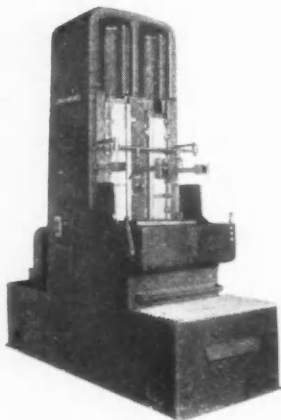
30 New Product Items And Other High Spots, Such As:

A merry-go-round conveyor which speeds front end assembly; announcement by Citroen of a \$900 car; trends in aircraft research; how more original designs would help the national air races; two new Vauxhall models; a map showing location of motor vehicle assembly plants in the United States; and eleven appraisal guides for automobile loans.

*News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3*

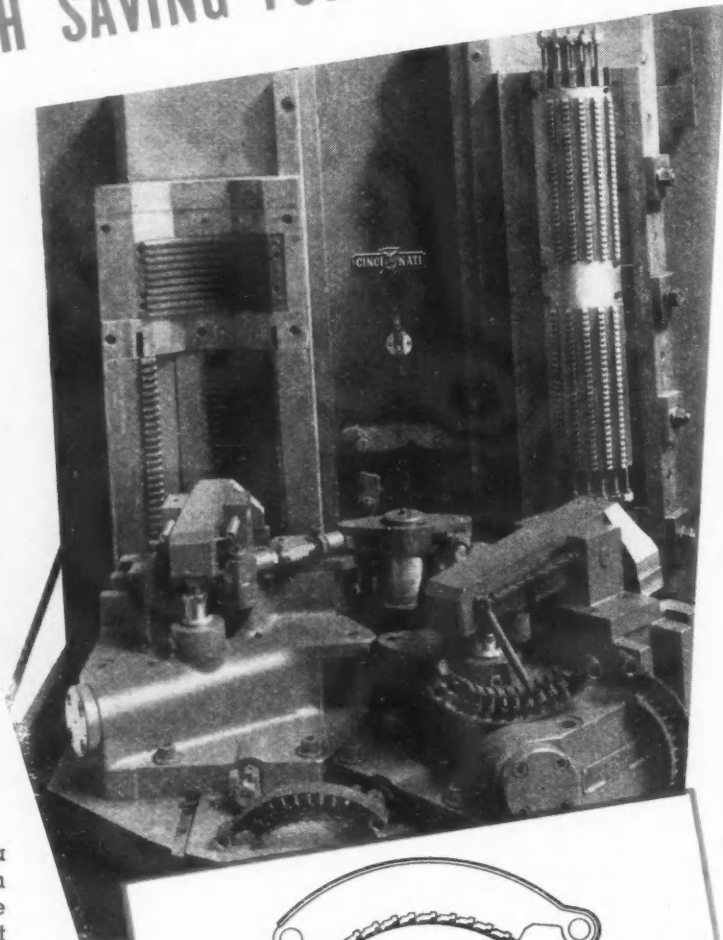
Hydro-Broaching

RINGS UP A CASH SAVING FOR KEY FRAMES



CINCINNATI No. 10-66 Duplex Vertical Hydro-Broach Machine. Complete specifications may be obtained by writing for catalog M-1387-2.

Right: Close-up of fixtures and broaching inserts for broaching several sizes and styles of key frames.



● Cash register key frames must have a good finish and accurate dimensions on the inner and outer radii. To obtain these requirements at low cost, one prominent manufacturer now broaches them on a CINCINNATI No. 10-66 Duplex Vertical Hydro-Broach. ¶ Two work-holding fixtures, mounted on the swivel table of the machine, clamp and unclamp automatically. Interchangeable locating devices are provided for several sizes of parts. Some of them are broached on the outside curved surface only (left-hand fixture) while others, like those shown on the machine table and in the drawing, are broached on the outside and inside curved surfaces, progressing from the right-hand fixture to the left. ¶ The critical problems involved in broaching these key frames—fragile parts, correct clamping pressure, wide cut—all were solved by Cincinnati Application Engineers to bring about a substantial saving in manufacturing costs. These men can draw upon many years of Cincinnati broaching experience, and

Drawing of one style of key frame broached on the machine illustrated here. Heavy lines indicate broached surfaces.

Part name	Key frame
Material	Cast iron
Operation	Broach inner and outer radii
Depth of cut	$\frac{1}{16}$ "
Production	144 per hour
Machine	CINCINNATI No. 10-66 Duplex Vertical Hydro-Broach

they have a wide range of Hydro-Broach Machines at their disposal to help you turn out better products at lower costs. It will pay you to submit to them your machining problems which may be applicable to broaching.

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NEWS *of the*

AUTOMOTIVE INDUSTRIES

Vol. 99, No. 7

October 1, 1948

GM August Production Higher Than July

GM's August production totaled 195,029 cars and trucks in U. S. and Canadian plants. The total was a moderate increase over the 186,776 units built in July. Of the August total, 149,113 were passenger cars, and 45,916 were trucks. Total production for GM up to Sept. 1 was more than 200,000 ahead of the same date last year. Output for the first eight months of this year was 1,444,164, compared with 1,205,051 for the same period of 1947.

Oldsmobile Opens New Engine Plant

Now producing new 1949 Oldsmobile eight-cyl engines, a new plant with 169,000 sq ft has been opened at Lansing, Mich., by GM's Oldsmobile Div. Utilizing 300 machines operated by 800 employees, the plant has a production capacity of 30 engines an hour, and it is expected that monthly production will be increased until a rate of 5000 engines is reached in November. Each of the 300 machines in the plant is new, and many were designed and built especially for the production of the new engine.

Truckstell Overdrive for Chevrolets

Called the Truckstell Tip-Toe-Matic, an overdrive for postwar Chevrolet cars has been introduced by the Truckstell Mfg. Co., Cleveland. Described as an all-mechanically-controlled overdrive which eliminates the need for electrical, hydraulic, or vacuum controls, the device is said to be "automatic but driver controlled," and gives the driver the option of conventional or overdrive in all forward speeds.

AC Spark Get \$23 Million USAF Contract

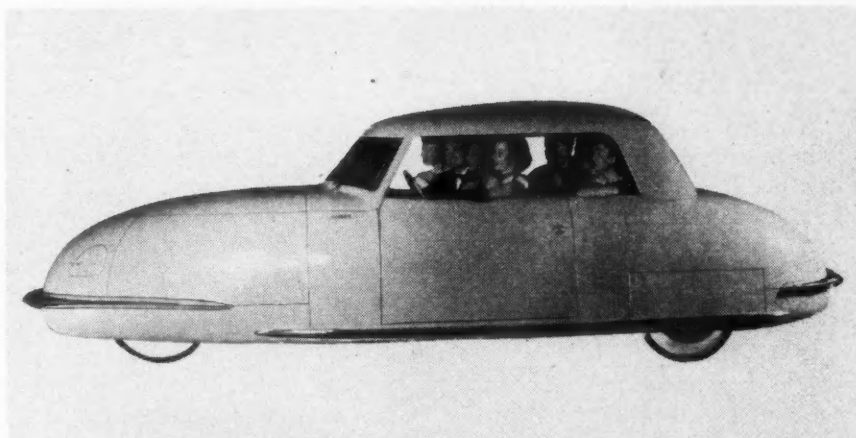
A \$23 million contract for bombing navigational equipment has been awarded by the U. S. Air Force to GM's AC Spark Plug Div. A war-built plant in Milwaukee, Wis., has been leased to AC Spark Plug to build the equipment. Another contract, this one for \$1.5 million, has also been granted AC

Spark Plug for the manufacture of a new improved gunsight.

Five Millionth Unit Made by Buick

The Buick Motor Div. of GM produced its five millionth passenger car recently—a 1948 model Roadmaster sedan equipped with Dynaflo Drive.

move was the creation of a new executive vice presidency and appointment of Harlow H. Curtice, general manager of Buick Motor Div., to fill the post. He will be in charge of all general staff activities for the corporation. Ivan L. Wiles, Buick comptroller, succeeds Mr. Curtice as general manager of Buick, and has been elected a vice-president of GM. The second Buick executive to



SEVEN OVER THREE

Now being built by the Davis Motorcar Co. at its plant in Van Nuys, Calif., this new seven-passenger, three-wheeled car with a 125-in. wheelbase will be powered by either a four or six cyl Continental engine (optional buyer choice). Davis is also constructing an eleven passenger station wagon on the same chassis.

K-F to Lease Cleveland Blast Furnace

The Kaiser-Frazer Corp. has elected to exercise its option of a 20-year lease with the right to purchase at any time on the government-owned blast furnace at Cleveland now being operated by Republic Steel Corp. K-F had the option to either lease the plant or to buy it outright. Both GM and Chrysler are customers of Republic, and it is not yet known what the effect on their supply will be when K-F takes over the mill from Republic some time next year.

Curtice Promoted by GM In Staff Shuffle

GM has announced an extensive reorganization of its executive staff and operational setup. The most important

move into the corporation staff is William F. Hufstader, general sales manager, who was made a vice-president of the corporation in charge of the distribution staff. He succeeds W. F. Lewellen who is resigning to go into business for himself. The above changes will go into effect Nov. 1. Effective Sept. 16, L. C. Goad, GM vice-president and general manager of Fisher Body Div., was named executive in charge of the body and assembly divisions group. He succeeds Thomas P. Archer who is on disability leave of absence, and who will serve as a member of the administration and operations policy committee and on other assignments when he is able to return. John J. Cronin, general manufacturing manager of Fisher, succeeds Mr. Goad as general manager, and has been elected a vice-president.

An organization change affecting the

NEWS of the AUTOMOTIVE INDUSTRIES

Fisher Body Div. has been the separation of the Ternstedt operation resulting in a separate division to be called the Ternstedt Div. J. W. Jackson will continue as general manager reporting to Mr. Goad. Another organizational change is the creation of a business research staff under the direction of Stephen M. DuBrul. The social and economic relations section which he formerly headed will be discontinued and its duties transferred to the new business research staff effective Nov. 1. GM has also reorganized staff activities formerly reporting to W. F. Armstrong, who was recently made general mana-

groups, will be under the charge of O. E. Hunt. Harlow Curtice will have under his general direction distribution, styling, engineering, research, personnel, employee relations, public relations, business research, procurement and schedules, facilities and processes, real estate and the Motors Holding Div. Albert Bradley is the other executive vice-president, with offices in New York.

NADA Appoints Kneebone as Managing Director

Robert W. Kneebone of Chicago has been appointed to fill the newly created

Army's New Aircooled Engine May Have Commercial Use

Although neither Continental Motors nor the Army is saying much about the commercial possibilities of the new aircooled engine (described in the July 1, page 35, and August 1, page 40, issues of AUTOMOTIVE INDUSTRIES) developed by Continental in cooperation with the Ordnance Dept., it is known that truck and bus manufacturers are watching it closely. The engines were not developed for commercial use and would require some modifications for use in trucks and buses. In basic design, however, they are considered suitable for commercial use. In developing the engine, the Ordnance Dept. is working toward standardization in order to reduce as far as possible the number of different spare parts required for maintenance. The engines which use only two basic cylinders of 4.625 and 5.75 in. diam, in each of which all parts are interchangeable, have been developed within six models ranging from 125 to 1040 hp. During the last war, six different engines were used in medium tanks requiring six sets of tools, six sets of maintenance literature, and 5165 different spare parts. With one standard design engine for medium tanks, the number of spare parts will be reduced to 954 with one set of maintenance literature covering all size engines.

The new engines operate on 80-octane gasoline and can be used in other land vehicles as well as in tanks. Because of their design, they can be operated in a vertical position effecting saving in space, a feature that might well appeal to truck manufacturers along with the appreciable saving in weight for the same horsepower. The 250-hp aircooled model weighs 777 lb. Because of its design the engine is said to require less air for cooling than a liquid-cooled engine of equal horsepower. The engine is designed with a torque curve suitable for torque converter drive. Thus far only experimental engines have been built, and no contracts have been awarded for production. It is believed that mass production on at least some of the models probably could be obtained in about six months after the contracts are awarded.

Military officials at the Detroit Tank Arsenal have announced a new 70-ton tank powered by the new aircooled engine developed by Continental Motors in cooperation with Army Ordnance. It is driven through a torque converter and controls have been so greatly improved that it handles almost as easily as an automobile, according to re-



HYDRAULICALLY-CONTROLLED HARROW

The hydraulic control of the Ford Tractor is used to adjust the penetration and working depth of this new Dearborn Motors' lift-type, rigid-frame, tandem disk harrow in the field. Transportation of the harrow is said to be facilitated by its rigid frame construction.

ger of the Chevrolet Div. Changes include: Rodger J. Emmert, factory manager at GMC Truck & Coach Div., will head the facilities and process staff, and Roger Kyes, who recently came to GM from Harry Ferguson, Inc., will be in charge of a procurement and scheduling staff. Fred G. Tykle will continue to head the real estate staff.

Under the new setup of four executive vice-presidents, various divisions and staffs have been regrouped. The car and truck, body and assembly division and the accessory groups will be under the supervision of M. E. Coyle. All other operating divisions, including the engine, Dayton and household appliance, and overseas and Canadian

position of managing director established by the NADA last January. He has been a member of the executive staff of the American Banker's Association for the past 16 years.

Nash Output Up Following Model Change

Production of 1949 Nash cars is increasing steadily following the replacement of all jigs, fixtures and major assembly equipment in connection with the new models. Nash was out of production for five weeks during the changeover, but is expected to be back to a daily rate of 600 by the time the new cars are introduced Oct. 22.

NEWS of the AUTOMOTIVE INDUSTRIES

ports. Sixteen of the new units have been manufactured thus far.

New Oldsmobile Engine Has 7.25 to 1 Ratio

Speculation about the compression ratio of the new valve-in-head V-8 Oldsmobile engine was settled in mid-September when visiting newsmen inspected the new engine plant at Lansing, Mich. The engine will have a compression ratio of 7.25 to 1, which was adopted as the optimum for fuel available throughout the country. It will operate satisfactorily on 85 octane fuel which is available generally. However, it is understood that an 8 to 1 ratio will be offered optionally to buyers in areas where 91 octane fuel can be obtained. The engine develops 135 hp at 3600 rpm with 7.25 to 1 ratio. Displacement is said to be about 300 cu in. The engine is 10 in. shorter than the previous in-line 8 and weighs only 30 lb more. It is equipped with hydraulic valve lifters which make it extremely quiet in operation.

The entire construction of the engine is much more rugged than heretofore to withstand the ultimate high compression ratio of 12.5 to 1 for which it is designed. A five-bearing crankshaft is used for greater rigidity. The engine is designed so that compression ratios can be stepped up in the future, as higher octane fuel becomes available, by gasket changes up to a certain point and from there on through use of different cylinder heads. Oldsmobile engineers say that friction loss is lower than with current engines because of a shorter stroke 3.5 in. instead of 4 in.) and lower piston speed. The heavier five-bearing crankshaft is also credited with reducing friction because of its greater resistance to bending under load. They also report that under test the engine shows a four per cent gain in mechanical efficiency and gives fuel economy about 1 mpg better than the present engine despite the increase of 20 hp in output. The new V-8 is now in production, but will not be used until 1949 models are announced toward the end of the year.

Ford May Spend \$6-7 Million in Chile

The growing importance of South America to the automobile industry was emphasized by the recent announcement that the Ford Motor Co. is ready to spend from \$6 to \$7 million to enlarge its assembly plants in Chile.

Air Force Jet Sets New Air Speed Mark

The world's speed record was recently broken by Major Richard L. Johnson, who flew a standard North American F-86 jet fighter plane at 670.981 mph at Muroc Lake, Calif. Powered by a GE J-47 jet engine, the plane carried six .50-caliber machine guns with full ammunition.

will be the testing of its new small turbo-jet engine, designated the XJ-55-FF-1, which is being produced for the U. S. Air Force.

Plant Guard Strike Hits September Output

September, which had looked like a high volume production month for the automobile industry, turned out to be



LIGHT AT NIGHT

Displayed at the 1948 convention of the American Association of Motor Vehicle Administrators in Detroit, a new "Scotchlite" reflective sheeting which can be silk screen printed with a full range of shades was used to reflectorize the station wagon shown above.

Isherwood Retires as AC's Gen'l Sales Manager

Wilson S. Isherwood, general sales manager of GM's AC Spark Plug Div., retired on Sept. 30. AC's first and only general sales manager, Mr. Isherwood was succeeded by John C. Hines.

Frederic Flader Building New Laboratory

Frederic Flader, Inc., scientific and engineering research concern, is constructing a new testing laboratory near its plant in North Tonawanda, N. Y., Frederic Flader, president, announced. The new laboratory will cost about \$45,000. Mr. Flader said that one of the main items of laboratory activity

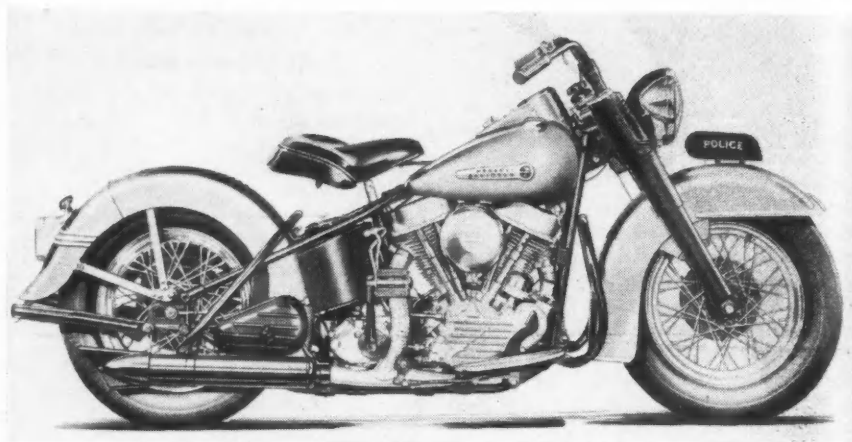
a disappointment because of the strike of a handful of plant guards at Briggs Mfg. The guards went on strike when their demands for an extra 10 minutes a day at time and a half to prepare for work were denied. As a result, members of the UAW-CIO refused to cross picket lines, halting Briggs production and operations at Chrysler Corp. passenger car divisions and at Packard and Willys station wagon lines which depend upon Briggs for bodies. From an overall standpoint, however, the strike will not cause too much damage to this year's production since Chrysler will have a chance to replenish its depleted stocks of cylinder heads and exhaust manifolds which were at a very low point because of the foundry strikes, and can also

NEWS of the AUTOMOTIVE INDUSTRIES

build up supplies of steel so that the lost production can be made up over a period of a few weeks. Packard and Willys will also be able to stockpile materials and regain most of the lost production.

Ford Sales Chief Sees 2-Year Seller's Market

Cars in the lower priced field will remain in the seller's market for another 18 months to two years in the estimation of J. R. Davis, Ford vice president and director of sales and advertising. At a meeting of Canadian automobile dealers at Banff, Canada, he said that the buyer's market will arrive much sooner for higher priced cars and that heavy trucks and certain makes of cars in the medium and high priced field are already available for immediate delivery. He said that while there is no doubt that high prices have shortened the potential market for cars, prices are still lower compared to national income and cost of living than they were in 1939. He said that the three cars in Ford price field have increased an average of 103 per cent since 1939. He pointed out, however, that per capita income has gone up 141 per cent, whereas the cost of living has increased only 71 per cent since 1939. Because of the acute steel shortage he predicted automobile and truck production in the United States this year would not go over



HYDRA-GLIDE HARLEY

A new departure from the traditional Harley-Davidson Motor Co. motorcycle front-end design is seen in this new 1949 model which introduces a hydraulic fork, called the Hydra-Glide. The new fork, featured on the 61 and 74-cu in., overhead valve models, uses long helical springs and a column of oil to provide improved comfort and handling ease.

five million units, which would be a gain of more than 200,000 over last year, but far under the increase expected by the industry earlier. He also added that next year production might fall off from this year's level.

U. S. Air Force Lists 7 Secret Combat Planes

A peek under the curtain of secrecy surrounding its combat planes under

development was recently given by the U. S. Air Force in a recent announcement which described seven planes now being built for speeds which range up to the supersonic. The seven planes, some of which are nearing completion and some of which are flying at Muroc, Calif., are the McDonnell XF-88, a two-engine penetration jet fighter; the Northrop XF-89, a two-engine, all-weather, jet fighter; the Lockheed XF-90, a two-engine penetration jet fighter with rocket engines for emergency speed bursts; the Republic XF-91, a single engine interceptor jet fighter with rocket engines for use at high altitudes; the Consolidated Vultee XF-92, an interceptor jet fighter with a V-wing, using rockets for top operational speeds over 800 mph; the Boeing XB-52, a huge bomber in the B-36 class powered by a turbine-propeller combination, and the Northrop X-4, a tiny sonic research plane powered by gas turbine engines.

Waller Succeeds Hufstader as Sales Manager of Buick

Otis L. Waller is the new general sales manager of Buick. He succeeds William F. Hufstader who has been made vice president in charge of distribution for GM. Mr. Waller was formerly assistant general sales manager with headquarters at Chicago. Other Buick appointments are: A. H. Belfie, director of merchandising, and J. B. Nash, Pacific Coast regional manager, as two new assistant general sales managers; Kenneth H. Hendershott, as controller to succeed R. L.

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the Seven Months' 1948 Totals.

MAKE				SEVEN MONTHS			
	July 1948	June 1948	July 1947	Units		Per Cent of Total	
				1948	1947	1948	1947
Chevrolet	51,321	57,567	59,676	408,934	375,962	20.86	20.91
Ford	39,104	16,527	39,479	215,502	295,119	10.99	16.41
Plymouth	31,649	14,941	23,120	189,204	179,353	9.65	9.97
Buick	18,565	19,961	19,935	145,192	134,779	7.40	7.50
Pontiac	16,127	17,430	18,390	133,651	120,544	6.82	6.70
Dodge	19,163	9,280	16,793	123,330	115,223	6.29	6.41
Oldsmobile	13,734	14,587	15,212	105,238	105,291	5.37	5.86
Studebaker	13,231	13,267	8,715	86,186	59,700	4.39	3.32
Nash	9,735	10,573	7,508	71,354	62,215	3.64	3.46
Hudson	10,497	11,686	9,038	69,505	59,096	3.54	3.29
Kaiser	10,655	11,239	4,137	66,594	22,750	3.40	1.26
Mercury	13,068	11,053	7,694	64,173	62,056	3.27	3.45
Chrysler	9,785	4,763	7,396	60,263	52,314	3.07	2.91
De Soto	7,224	3,677	5,632	46,313	40,021	2.36	2.23
Packard	7,380	8,007	3,807	45,539	25,010	2.32	1.39
Fazor	5,407	7,004	5,984	41,699	21,119	2.13	1.17
Cadillac	5,169	5,373	4,690	32,556	30,196	1.66	1.68
Crosley	2,680	2,734	1,356	16,161	6,764	.82	.49
Lincoln	3,957	3,723	2,235	16,007	14,492	.82	.81
Willys	754	1,541	2,298	14,475	13,596	.74	.76
Austin	1,012	925		5,513		.28	
British Ford	337	199		637		.03	
Playboy	11	9		33			
Tucker				1			
All Others	601	640	72	2,704	463	.15	.02
Total	291,206	248,926	263,167	1,960,734	1,798,065	100.00	100.00

* Data from R. L. Polk & Co.

NEWS of the AUTOMOTIVE INDUSTRIES

Wiles, new general manager of Buick, and Irving H. Larkin as general superintendent to succeed the late Fred W. Letts.

Austin Presents New Convertible

American popular acceptance of Austin cars has resulted in the purchase of a plant in Hamilton, Ont., Canada, which, it is expected, will produce 500 cars a week in a few months, Leonard P. Lord, chairman, Austin Motor Co. of England, stated on Sept. 22 at a dealer meeting in New York City. A new Austin model, the A90 Atlantic club convertible, was presented at the meeting by Mr. Lord.

Cub of Canada Now Making British Car Parts

Accessories for British motor cars are now being made in Hamilton, Ont., Canada, at the Cub Aircraft Corp. plant, Russell Gibson, president, declared. The accessories being made by the company generally include lines which are not standard equipment on British cars exported to Canada. The parts are being made for Austin and Hillman products, and some are being made for American Crosleys.

Oldsmobile to Drop 60 Series for 1949

Oldsmobile will not have a 60 series in its 1949 line. Instead the company will offer three lines: the 76, the 88, and the 98. The 76 will have the "A" body currently under development for Chevrolet, Pontiac and Oldsmobile, and will be powered by the conventional inline six engine. The 88 will be basically the same except that it will be powered by the new 135-hp V-8, valve-in-head engine. The 98 will use the same basic body currently employed in that series, although there may be moderate changes in trim treatment, and it will have the new V-8 engine.

Automotive Taxes Topped \$3 Billion Last Year

The automotive industries continue to increase in importance and size. That statement is supported by statistics contained in the 28th edition of *Automobile Facts & Figures* issued by the AMA. One noteworthy peak reached last year is not of any appreciable satisfaction to the automobile

industry, however. It deals with special motor vehicle taxes paid by American motorists last year which exceeded \$3 billion for the first time in history. While all state and local taxes hit new peaks in 1947, by far the greatest increase was in Federal excise tax collections which jumped 32 per cent over 1946. Other new records reported by the statistical yearbook include truck, bus and replacement parts production; employment and payrolls; dollar value of exports; vehicle mileage driven; car, truck, and bus registrations, and wholesale value of the industry's products. Another interesting fact mentioned in the publication is that four-door sedans account for the industry's largest production runs. It also notes an increase of more than 100 per cent in the percentage standing of convertibles and station wagons to all cars produced, being 7.2 per cent last year, compared with 3.5 per cent before the war.

New Northrop Raider In Production

Northrop Aircraft, Inc., has developed a new assault transport, the 16-ton C-125 Raider, for the U. S. Air Force from the prototype Northrop Pioneer. Now in production at Northrop, the three-engined Raider is said to be able to fly six-ton loads directly onto small battle zone landing strips. Expected to replace gliders for airborne

assault, the new plane is 67 ft long and has a wing span of 87 ft. Powered by three Wright R-1820 engines, it has an empty weight of 19,662 lb. The USAF has placed an initial order for 23 Raiders.

Norton Joins GM as Aide to Wilson

Wilbur H. Norton has joined the executive staff of General Motors and will work on special assignments reporting directly to C. E. Wilson, president. Mr. Norton was formerly president of Montgomery Ward & Co.

Oldsmobile Orders Double Since First of Year

Unfilled orders for new Oldsmobiles have more than doubled in the past six months. Latest reports show an all-time high of 836,408 orders on hand, compared with 408,296 in February when current models were introduced.

GM's Delco Appliance Div. Making New Car Clock

A new type of clock for use in automobiles is being produced in the Rochester plant of GM's Delco Appliance Div., it has been revealed by Paul H. Rutherford, general manager. The clock, which was 10 years in the design

NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the Seven Months' 1948 Totals.

MAKE	SEVEN MONTHS							
	Units			Per Cent of Total				
	July 1948	June 1948	July 1947	1948	1947	1948	1947	
Chevrolet.....	25,540	26,175	13,789	180,033	118,603	28.64	23.50	
Ford.....	22,935	21,695	17,735	141,612	120,577	22.55	23.89	
International.....	11,830	11,636	9,858	82,096	64,071	13.06	12.69	
Dodge.....	8,558	8,856	11,608	66,744	76,192	10.62	15.10	
G. M. C.....	6,181	5,608	3,479	40,703	30,779	6.47	6.14	
Willys Jeep.....	4,940	4,066	5,132	30,188	25,769	4.80	5.11	
Studebaker.....	5,286	2,987	3,502	28,820	23,980	4.58	4.75	
Willys Truck.....	3,027	2,841		15,845		2.54		
White.....	910	1,018	1,148	7,299	7,666	1.16	1.52	
Reo.....	1,012	954	880	7,297	8,192	1.16	1.62	
Diamond T.....	1,058	858	917	6,631	5,944	1.05	1.18	
Mack.....	848	814	1,034	6,374	5,632	1.01	1.15	
Divco.....	420	527		3,663	2,768	.58	.65	
Federal.....	334	324	546	2,940	3,298	.47	.65	
Brockway.....	201	200	381	1,681	2,527	.30	.50	
Autocar.....	227	185	386	1,684	2,802	.27	.56	
Crosley.....	203	230		1,621		.26		
F. W. D.....	175	53	95	581	733	.09	.15	
Sterling.....	38	26	76	284	364	.04	.07	
Kenworth.....	38	27		243		.04		
Ward La France.....	11	17	42	220	331	.03	.06	
Oshkosh.....	3	15	30	132	150	.02	.03	
Hudson.....	2	4	160	112	1,977	.02	.39	
Nash.....	2			15				
All Others.....	257	206	335	1,442	1,952	.24	.39	
Total.....	94,036	87,324	71,647	628,760	504,727	100.00	100.00	

* Data from R. L. Polk & Co.

NEWS of the AUTOMOTIVE INDUSTRIES



SUCCESSFUL RECRUIT

Successfully completing its initial flight, the North American Aviation XAJ-1, latest Navy carrier plane, is powered by two Pratt and Whitney Double Wasp reciprocating engines located under the wings and for added speed in combat, one GE-Allison turbo jet engine in the tail.

and experimental stage, is electrically driven, from the automobile's standard battery circuit, and is said to use only a small amount of current. It is standard equipment on all 1948 Cadillac models, and is also available as an accessory on Chevrolets.

Du Pont is Now Making Titanium

The Du Pont Co. has announced that it has begun the small scale manufacture of titanium metal, a new basic raw material for industrial development. A pilot unit of 100 lb daily capacity has been successfully placed in operation at the Newport, Del., plant of the Pigments Dept. This, so far as the company knows, is the first time ductile titanium metal has been produced for commercial exploration. The silver-white metal is light and strong, is highly resistant to corrosion, and has a higher melting point than the commonly used metals.

Motor Trucks Boost Share of Nation's Hauling Load

The Commerce Dept. reports that motor trucks are steadily increasing their share of the nation's freight hauling business at the expense of the railroads. The report says that a fairly substantial diversion of competitive traffic from the railroads to trucks is indicated, especially in less-than-carload lots. The report says further that the truck has virtually taken over all local short haul commodity movements and is steadily increasing its share of longer intercity traffic.

New Pulsejet Helicopter Test Flown

Designed and built by General Tire & Rubber's recently acquired Marquardt Aircraft Co., Venice, Calif., the Marquardt M-14 Whirlajet, a new pulsejet helicopter recently successfully completed test flights. Two pulsejet engines, one mounted on each tip of its rotary wing power the new helicopter which is said to have twice the payload carrying capacity of conventionally-powered helicopters for short distances. It has a gross weight of 1000 lb and its rotor diameter is 29 ft.

K-F Sends 1949 Models to Italian Car Show

The Kaiser-Frazer Corp. has shipped two of its 1949 Kaiser models to Italy for entry in the International Automob-

ile Show at Turin. The company will also have entries of other 1949 K-F models at the Paris Show Oct. 7 to 17, and in the Earl's Court Show in London Oct. 27 to Nov. 7.

Two Board Members Resign from Tucker Corp.

Two members of the board of directors of Tucker Corp. have resigned. They are Floyd D. Cerf, head of a Chicago investment firm, and Barnett Faroll, member of a grain and securities company.

Allison Boosts Thrust of USAF Turbo-Jet

GM's Allison Div. recently disclosed that Allison Model 400 (USAF J33) turbo-jet aircraft engines now in production produce 64 per cent more take-off thrust per pound of engine weight than the original models placed in production by Allison in 1945. The current production model of this engine is rated at 4600 lb take-off thrust and use of water injection increases this rating nearly 20 per cent. Allison is also developing a new turbo-prop engine for the Navy. Four of these new engines will power the Navy's new XP5Y Consolidated flying boat and other airplanes yet to be announced.

Goodyear to Make First Postwar Blimp

A contract for the first lighter-than-air craft to be built since the war has been awarded to Goodyear Aircraft Corp. by the Navy. The blimp will be nearly twice the size of those used during the war for anti-submarine warfare and will have a helium capacity 100,000 cu ft greater than the war-time

SUCCESSFUL PERFORMANCE

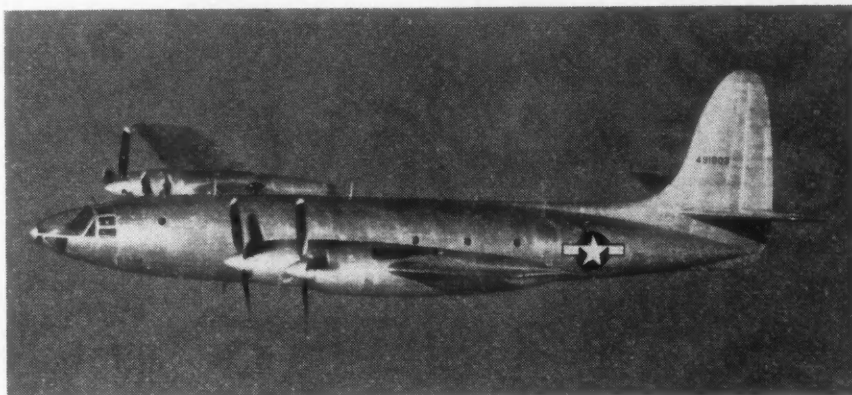
The Hawker N7-46, Britain's latest jet fighter, gave its first public performance recently at Langley, England, when the company's chief test pilot W. Wade put it through its paces at well over 600 mph.



Reuterphoto from European

NEWS *of the* AUTOMOTIVE INDUSTRIES

type M ships. Most unusual design feature will be the installation of the engines within the body of the car where they are accessible for repair and maintenance in flight. The engines will be aircooled 800-hp radial C7-BA1 Wright Cyclones. They will be connected through a system of transmission shafts and gears to 18 ft reversible controllable-pitch propellers mounted in nacelles attached to the car by outriggers. Another innovation in blimp construction is the use of a tricycle landing gear with the main wheels fully retractable into the propeller nacelles, and the nose wheel retractable into the bilge of the car. The new ship is 324 ft long, 71 ft wide, 92 ft high, and weighs approximately 34,000 lb empty.



PHOTOGRAPHIC DASH

Accomplished in a single flight for the first time, a continuous coast-to-coast aerial photographic survey of the U. S. was made recently in seven hours by the Republic XR-12 photo reconnaissance plane shown above. The plane is powered by four 3000-hp Pratt & Whitney engines, has a speed over 450 mph and a range over 4000 mi.

Motorola Buys Radio Rights From Int'l Detrola

Through the purchase of inventory and certain assets of the Car Radio Div., International Detrola Corp., Motorola, Inc., for the first time will be able to manufacture and sell car radios directly to automobile manufacturers. Motorola will continue production of radio and television sets, plus manufacture of new car radios in its Detroit plant.

Government to Supervise German Scrap Import

American scrap dealers are reported to have agreed to a government proposal that a single agency be formed to buy and sell German scrap. Under the plan the agency would buy the scrap on terms set by the occupation authorities, and distribute it to American mills under government allocation. According

to estimates of the American steel experts, 15 million tons of scrap metal over and above German needs would be available under the plan. American industry, however, would not get the full 15 million tons since British authorities are also claiming their share.

Sun Oil Plans \$16 Million Expansion at Toledo

An advanced catalytic cracking process called Houdrifiow, a joint development of the Houdry Process Corp. and the Sun Oil Co. will be featured in a \$16 million expansion program at Sun's Toledo, O., refinery. The new process employs a pneumatic lift for circulating the catalyst. Also scheduled for construction at the Toledo refinery are a large gas recovery and gasoline stabili-

zation plant, a new polymerization plant, a crude distillation unit, a vacuum flash unit and auxiliary units and equipment required by the major installations.

Hughes to Fly Giant Boat in December

The first official flight of the Howard Hughes' \$25 million flying boat has been announced for the middle of December, pending the results of water tests to be made in October. The plane is constructed almost entirely of laminated wood, is powered by eight 3000-hp engines, and will hold 700 persons.

K-F Separates Advertising of Kaisers and Frazers

The Kaiser-Frazer Corp. has taken another step in an apparently long-range plan to give its Kaiser and Frazer cars separate identities. The latest step is the separation of advertising campaigns on the new models. The Kaiser was introduced in late September and the Frazer will follow sometime this month. Also, the two cars are to be much more different in appearance and appointments than they were previously.

North American Building New Warehouse

North American Aviation, Inc., has begun to build a new \$750,000 warehouse on a 17-acre tract adjacent to the company's main plant in Los Angeles, Calif.

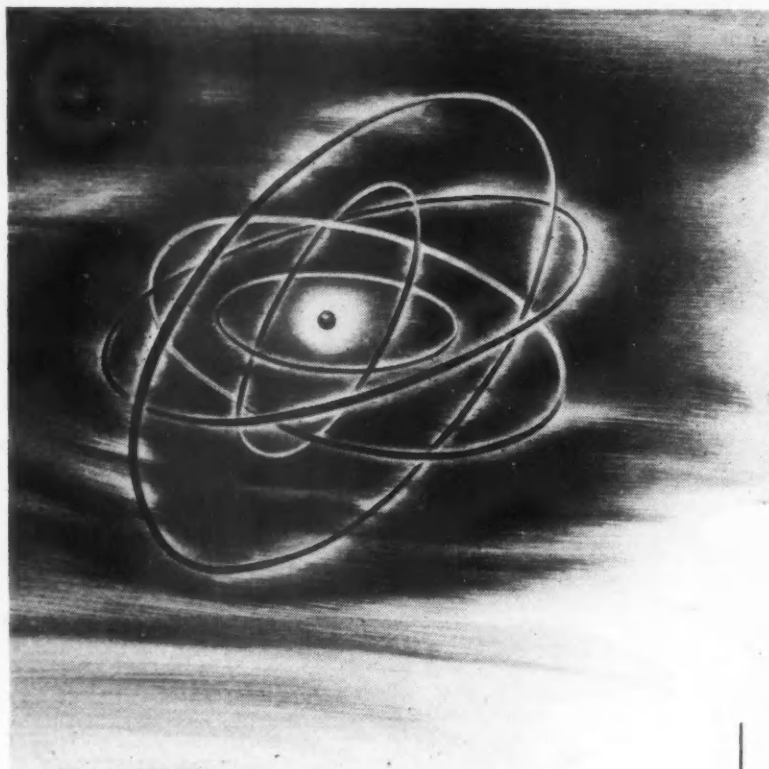
(Turn to page 56, please)



Reuterphoto from European

THREE ON A HORSE

The Cierva Air Horse shown above, reportedly the biggest helicopter in the world, was exhibited at the recent air display at Farnborough, England. The Air Horse has three rotors, weighs 7.5 tons, and is said to carry 24 passengers at 115 mph.



Atoms

ISOTOPES* for scientific, industrial, medical and agricultural use constitute the first great contribution of the development of atomic energy to peacetime welfare. Industrial power from nuclear energy may be a decade or longer in the future and most other applications are still largely speculative. But isotopes produced in the Nation's atomic energy establishment at Oak Ridge, Tennessee, are already at work in more than 300 laboratories and hospitals in this country and abroad, adding to man's store of knowledge about himself and the world around him.

Isotopes assist science in two ways: as sources of radiation for many potentially important uses including the treatment of disease and as "tracers" of processes formerly difficult or impossible to observe. As tracers, they are proving themselves the most useful new research tool since the invention of the microscope in the 17th Century; in fact, they represent that rarest of all scientific advances, a new mode of perception.

There are differing kinds of atoms called isotopes in nearly all of the chemical elements (hydrogen, oxygen, carbon, iron, copper, etc.). The atoms of any chemical element are all alike in their chemical behavior—the way they combine to make all material things. Most elements, however, have atoms that are not alike in their nuclear properties. For example, every copper atom has 29 electrons whirling about its nucleus, and it is this number (the atomic number)

* Isotopes are a group of atoms of the same element, all of which have the same atomic number, occupy the same position in the periodic table of chemical elements, have identical chemical behavior, but differ in atomic weights due to having different numbers of neutrons in their nuclei. Having the same atomic number, the number of electrons for each isotope of the same element is the same.

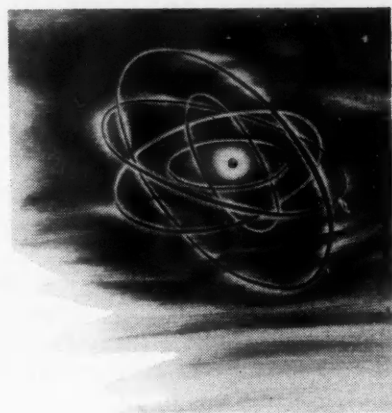
WHILE nuclear energy power plants are still in the early stages of development for generating electricity and for propulsion of aircraft, isotopes, a by-product of the Atomic Energy Commission's operation at Oak Ridge, already are being used by industry in a practical way as a research tool. Of the large variety of isotopes now available, many of them are being employed in over 1000 projects in more than 300 laboratories of industrial concerns, universities, research institutions and hospitals of the United States and foreign countries. Some 460 of these projects are in industrial research, chemistry, physics and metallurgy. Recently the Ford Motor Co. received a shipment of isotopes for research in determining the gage of steel sheets as they come from the rolls in the hot rolling operation, as a means of locating from outside the cupola just where the slag line is, and when the metal is ready for pouring.

Because of the growing interest in this field, start-in this issue *AUTOMOTIVE INDUSTRIES* is publishing two articles that give a complete picture of the industrial application of isotopes. This first article deals with their production, the procedure for procuring them, and their distribution to date. The second article, to be published in an early issue of *AUTOMOTIVE INDUSTRIES*, will tell how they are being utilized by various companies. Both articles are authoritative in that they comprise extracts selected by the editorial staff of *AUTOMOTIVE INDUSTRIES* from the recent report submitted to Congress by the United States Atomic Commission.

that makes copper behave the way its does chemically. But the nucleus of some atoms of copper contains a total of 63 particles (29 protons and 34 neutrons) while the nucleus of other atoms of copper contains 65 particles (29 protons and 36 neutrons). Since these two kinds of copper atoms have different numbers of neutrons in their nuclei, they have different atomic weights. They are the two natural or "stable" isotopes of the element copper.

Copper atoms can be made, in nuclear reactors and in cyclotrons, which have nuclei containing some number of neutrons other than 34 or 36. These artificial nuclei are unstable. Any one of them sooner or later converts itself into a stable nucleus by giving off particles and energy rays. These artificial "unstable" copper atoms are called the radioisotopes of copper. The radiations from the radioisotopes of the various elements are all different, but they all are able to penetrate solid matter to a greater or less degree.

s Go to Work for Industry



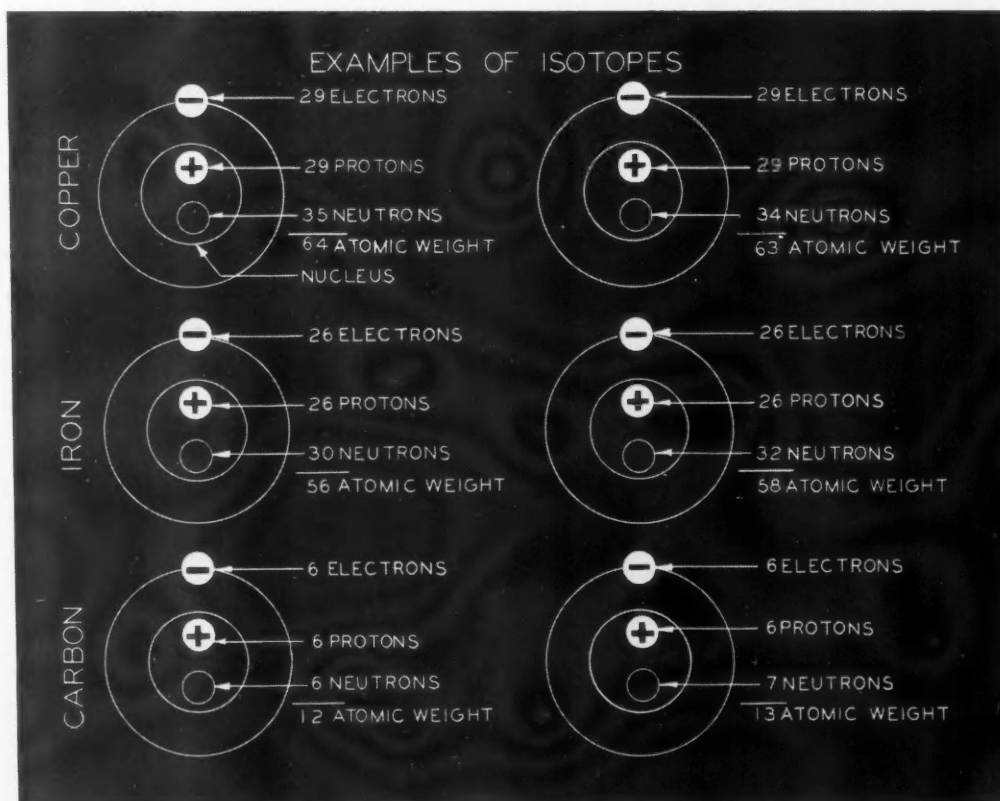
All told, the 96 known chemical elements have more than 800 isotopes, stable and radioactive. Carbon, for example, has five isotopes; that is to say, there are five different kinds of carbon atoms all chemically the same because their nuclei carry the same electrical charge. Where they differ is in their weight. The five kinds of carbon atoms weigh approximately 10, 11, 12, 13 and 14 times as much as the fundamental hydrogen nucleus. The variation in the numbers of neutrons in their nuclei, which causes these weight difference, is also responsible for differences in stability. Two of the carbon isotopes are natural and "stable," three are man-made and "radioactive."

The two natural isotopes occurring in ordinary carbon are carbon 12 and carbon 13 (C 12 and C 13). Of each 100 carbon atoms found in nature, 99 will be C 12 and one will be C 13. This is true whether you

find the carbon in the starch in a potato, the glycogen in the liver, or the coal underground; in the graphite in a pencil, the steel in a knife blade, or the diamond in a jeweler's window.

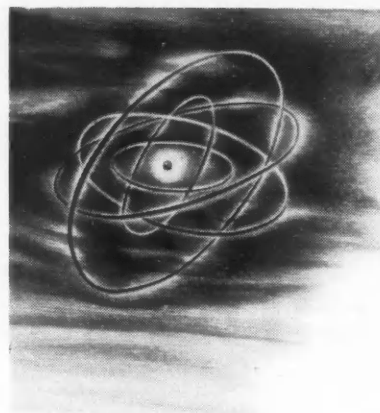
During the 1930s, physicists succeeded in processing a few of the lighter elements so as to "enrich" them in their rarer isotopes. They produced carbon, for example, that contained 20 per cent and more of C 13, which was consequently slightly heavier than natural carbon, although chemically the same.

Also in the 1930s, while some physicists were learning to separate (or concentrate) the stable isotopes, others discovered how to manufacture radioactive isotopes that do not occur in nature. C 11 and C 14, for example, are man-made carbon atoms which are just as truly carbon in the chemical sense as C 12 and C 13. But the unnatural number of neutrons in their



nuclei makes them unstable. They decay into stable elements (C 11 into boron; C 14 into nitrogen) and in so doing send out radiations from their nuclei. The radioactive isotope puts nuclear energy at the service of the investigator and thus tremendously increases his power of perception.

Generally speaking, the signals sent out by radioisotopes can be readily distinguished one from another. The radiation of C 11, for instance, is very penetrating or "hard," that of C 14 is very "soft." The intensity of the radiation of a given element, depending upon the rate at which its atoms transform into the stable state, is directly related to its effective life of "half-life," to name the unit in which this rate of decay is measured. The half-lives of the elements are determined by their nuclear compositions, and nothing that man does can lengthen or shorten them by as much as an instant. C 11, with its intense radiation, has a 21-minute half-life. This naturally limits its usefulness for most investigations. C 14, on the other hand,



has a half-life of 5100 years. Most half-lives of the radioisotopes lie somewhere between these extremes, although a few, like that of C 10 (nine seconds), are so short as to rule these isotopes out as research tools.

Production of Radioisotopes

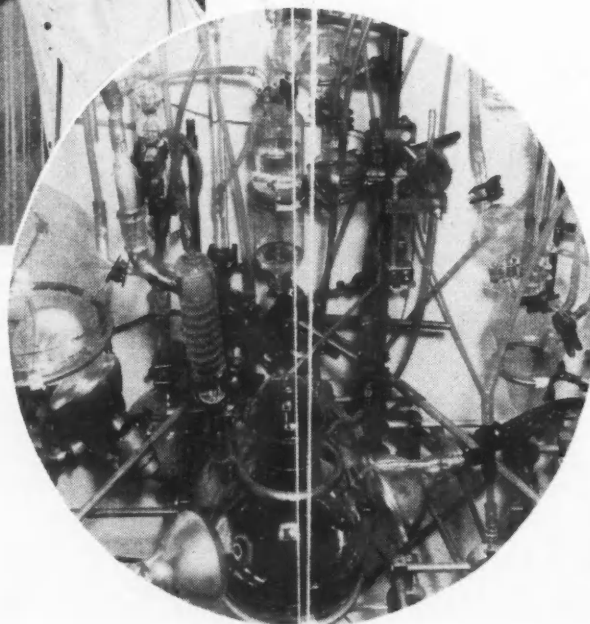
The artificial production of radioisotopes for scientific use dates back only about 14 years. However, the radioactive elements that occur in nature were used as sources of radiation, and even as tracers, virtually from the time of their discovery during the early years of this century. In fact, Hevesy, the Danish investigator who, in 1912, demonstrated that radium-D was chemically the same as lead (thus helping to prove that isotopes exist) used the radiations of the radium-D lead isotope to learn about the chemical behavior of lead. This was the first tracer experiment.

Most of the naturally occurring radioactive isotopes belong to the heavy elements between thallium (number 81 in the table of the elements) and uranium (number 92). None of these enter much, if at all, into life processes. Therefore, few biological tracer experiments were performed with the natural radioisotopes. In the early years of the century, scientists used them primarily for treating diseases. The main use was of radium and its associated elements.

The modern era of the utilization of radioisotopes as scientific tools began less than 15 years



(Above) Here is one of the remote control operations in the extraction of separate fission elements such as radioactive isotopes for experimental use. All operations are done from the outside. The course of the reaction taking place inside the heavy concrete cubicle is observed through periscopes. (Photo by U. S. Army Signal Corps).



(Left) This view inside a "hot" cell, as seen through a periscope shows the complex equipment necessary for chemically processing highly radioactive materials behind thick concrete walls. (Photo by U. S. Army Signal Corps).

ago. In 1934 the Joliot-Curies in France discovered that radioactive isotopes of the naturally stable elements could be produced by nuclear bombardment. Within a few years, cyclotrons and other particle accelerators had produced radioisotopes of all of the 83 stable elements. By 1940 some 370 varieties were known. The cost and scarcity of isotopes would long have been prevented their use in most laboratories had it not been for the wartime development of the nuclear reactor, or atomic pile.

These can manufacture radioisotopes in hitherto undreamed-of quantities. For example, the Oak Ridge pile in a period of a few weeks has produced more than 200 millicuries of carbon 14—millions of times more than the amounts previously available. The operating cost was about ten thousand dollars. Theoretically, it would take one thousand cyclotrons to equal this output, and the operating cost would be well over a hundred million dollars.

The Manhattan Project began development work even before the war ended and in June 1946 announced that pile-produced radioisotopes would be available. The first shipment was made on Aug. 2, 1946, almost exactly a year after the first use of atomic bombs in warfare. At first the radioisotopes were allotted only for research and medical use. Although the pile had sufficient capacity to manufacture isotopes for all purposes, time was needed to develop the strange new processes, skills, and apparatus required for their production.

Pile Production of Radioisotopes

Broadly speaking, there are three ways in which neutrons in the pile produce radioisotopes: (1) by splitting atoms of fissionable uranium into new atoms of entirely different elements—fission products, so-called—which are radioactive themselves; (2) by being captured in the nuclei of atoms of special "target material" inserted into the pile, turning them into heavier isotopes of the same element; (3) by altering the electrical charge of the nuclei of atoms of target material, thereby transmuting them into isotopes of a different element.

Uranium fission products removed from the pile contain a great variety of radioactive materials, which—in method (1)—can be extracted and purified by chemical means. However, the radioisotopes obtained are all those of elements near the center of the atomic scale between zinc (number 30) and gadolinium (number 64). With the exception of iodine 131, these do not now enter significantly into medical, biological, agricultural, or most industrial processes. Therefore, most of the radioisotopes supplied by Oak Ridge must be prepared by methods (2) and (3). These call for the preparation and pile irradiation of special target materials. Phosphorus 32, a widely used radioisotope, can be produced by both methods and may be used to illustrate.

In the production of phosphorus 32 by "neutron capture," method (2), phosphorus 31, contained in phosphate, is put into aluminum cans which are set in holes in a graphite block and pushed into the center of the pile. Each atom of the stable element phosphorus 31 that captures a neutron becomes phosphorus 32.

But not enough neutrons are present in "low flux" piles to convert more than a small proportion of the phosphorus atoms, to the radioactive state. Hence the phosphorus 32 is still much diluted with phosphorus 31, and the treated phosphate is not highly radioactive.

In practice, therefore, phosphorus 32 is usually produced by method (3), "transmutation." This process starts with a target element different from the element of which an isotope is desired. Sulfur is the target for the production of phosphorus 32. Bombardment by neutrons in the pile changes the electrical charge of the nuclei of some of the sulfur atoms, and thus transmutes them into phosphorus 32. When the

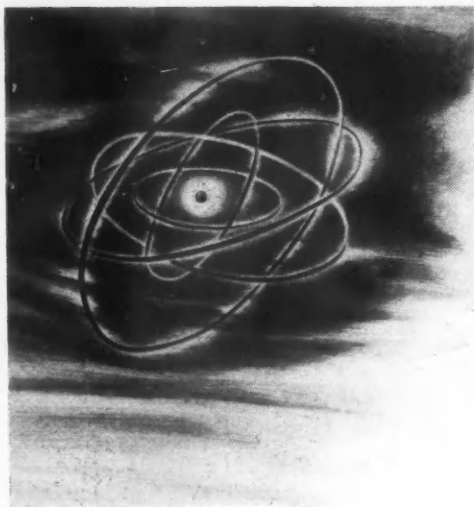


This photo, which illustrates the type of box used for shipping radioisotopes from Oak Ridge, shows a capsule of radioactive chemical phosphorus being withdrawn from the lead container located in the center of the box. (U. S. Army Photograph).

sample has been removed from the pile, the radioactive phosphorus can be chemically separated from the target sulfur. Phosphorus 32 in a very pure form, high in radioactivity, can thus be obtained. Unfortunately many important radioisotopes—those of calcium, iron, and zinc, for instance—cannot effectively be made by transmutation. They can be produced only by neutron capture, and this, as stated previously, gives a product low in radioactivity. When a pile of higher neutron flux becomes available, it will be possible to produce radioisotopes of greater usefulness for research.

From the preparation of the target material to the final shipment of the product, the production of radioisotopes demands skilled personnel and special equipment.

When the pile is shut down for the removal of the



irradiated samples, each member of the team of workers must know precisely his assignment in the operation and carry it out quickly and without error. Geiger counters and other radiation detection equipment must be used constantly to check the radiation present. In subsequent chemical treatment of materials, the work must be carried on behind lead shields, the workers using tongs and mirrors to avoid exposure. Many chemical operations are conducted inside a "hot lab," a room with thick concrete walls in which apparatus is manipulated from outside by remote control devices, the chemist viewing his work through periscopes. Each radioisotope, moreover, is a separate production problem, involving its own combination of requirements—for target material, irradiation time, chemical treatment, safety precautions, and the rigid time limits associated with its inflexible half-life.

By late 1947, the increased supply of radioisotopes permitted liberal allocations for research in all fields. This present situation is the result of an intensive development effort on the part of the contractors operating the Oak Ridge pile, the Monsanto Chemical Company from mid-1945 and the Carbide and Carbon Chemicals Corporation after January, 1948. They have achieved the routine production of the regularly used radioisotopes. The process of pile irradiation, chemical separation test-

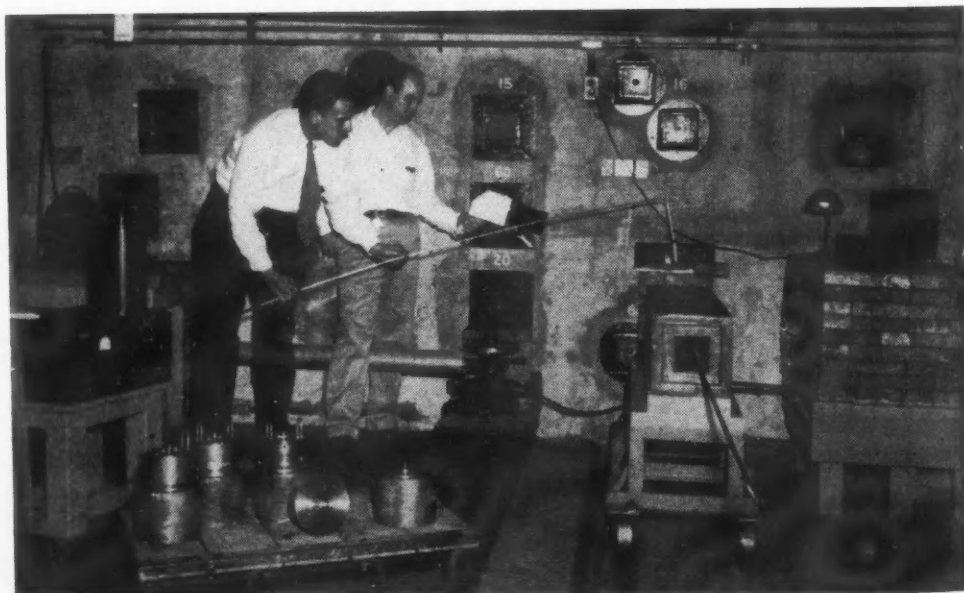
ing, handling and shipment have been taken over by trained laboratory workers, leaving the research scientists who developed the procedures free to concentrate on the harder-to-produce isotopes and the other problems associated with wider and safer utilization of radiomaterials.

Special Procedures for Shipment of Radioisotopes

The half-life of sodium 24, a radioisotope widely used for medical research and diagnosis, is 14 hours 48 minutes; within that time, half of its atoms will have transmuted themselves into a staple isotope of magnesium and half of the radioactivity will have been dissipated; in 29 hours 36 minutes three-quarters of the radiosodium will be gone. Potassium 42, also widely used, has a similar half-life. Shipments of such isotopes must be scheduled in advance with airlines and other carriers and customers notified of the hour of delivery.

The penetrating radiation from many radioisotopes is the other important factor governing shipping procedures. Radioisotopes distributed from Oak Ridge are shipped by common carrier—by airline, railroad and truck—in specially constructed containers, which range in weight from less than a pound to a ton, depending upon the thickness of lead shielding required to stop the radiation. Radioisotopes such as carbon 14, phosphorus 32, and sulfur 35, can be packed in light containers. Sodium 24, cobalt 60, and iodine 131, on the other hand, require heavy containers, the average weighing between 100 and 150 pounds. The latter type of radioisotope, in its glass or aluminum can, is placed in a steel container, surrounded by a lead shield which is supported firmly inside a strong wooden box. After packing, the box is checked with a sensitive detection instrument, and if radiation reaching the outside is still above completely safe limits, the consignment is repacked with a thicker shield.

(Turn to page 82, please)



Here an operator is removing a can of radioisotopes from a pile. A health physicist is monitoring the sample. (Photo by U. S. Army Signal Corps).

Merry-Go-Round Conveyor Speeds Front End Assembly

AS a part of the 1949 Ford production program, sub-assembly has been greatly facilitated by the installation of a new 180-ft merry-go-round assembly conveyor for the integration of the front-end sheet metal unit including: fenders, aprons, front grille, and radiator. Located alongside the final assembly line, the conveyor has 18 platform stations on which the sub-assemblies are built. The new line replaces a smaller merry-go-round used before and in addition to many mechanical improvements it offers greater convenience to the operators by providing more room and relieving crowding at work stations.

Perspective of one segment of the merry-go-round conveyor showing about a half dozen platform stations. As may be seen in the foreground, the operators travel with the platform and have plenty of elbow room.



Close-up of one of the assembly platforms gives an impression of the nature of the sub-assembly as it nears completion.



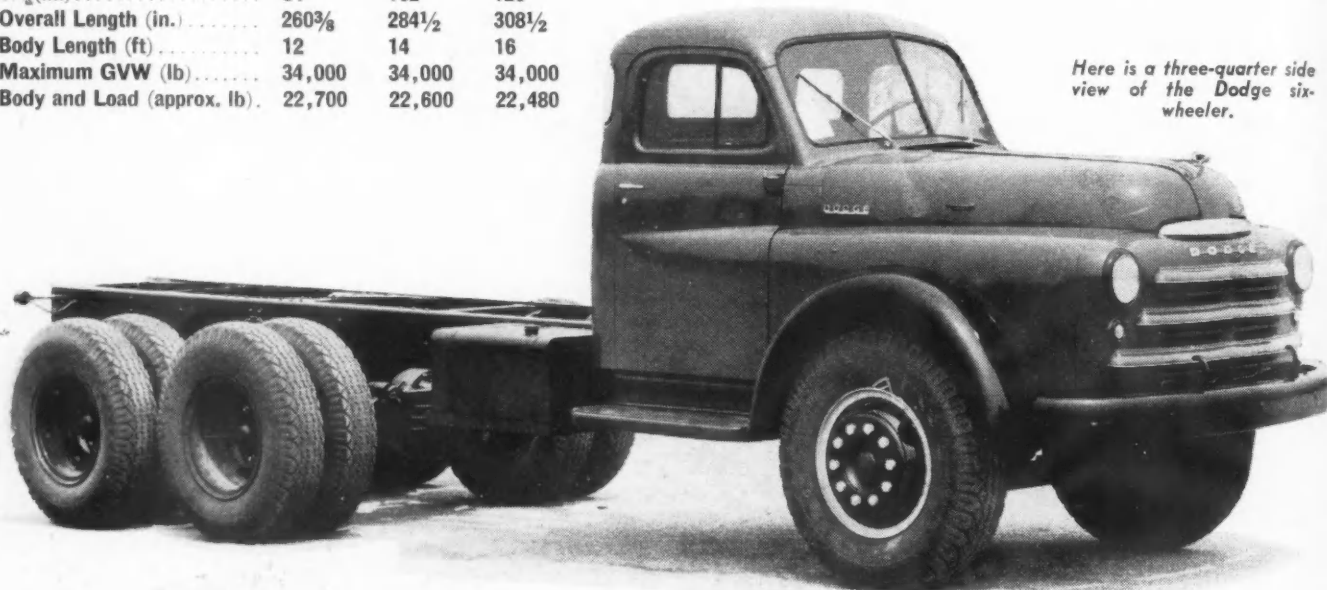
Model VX Six-Wheeler

Chassis Dimensions and Vehicle Weights and Loads

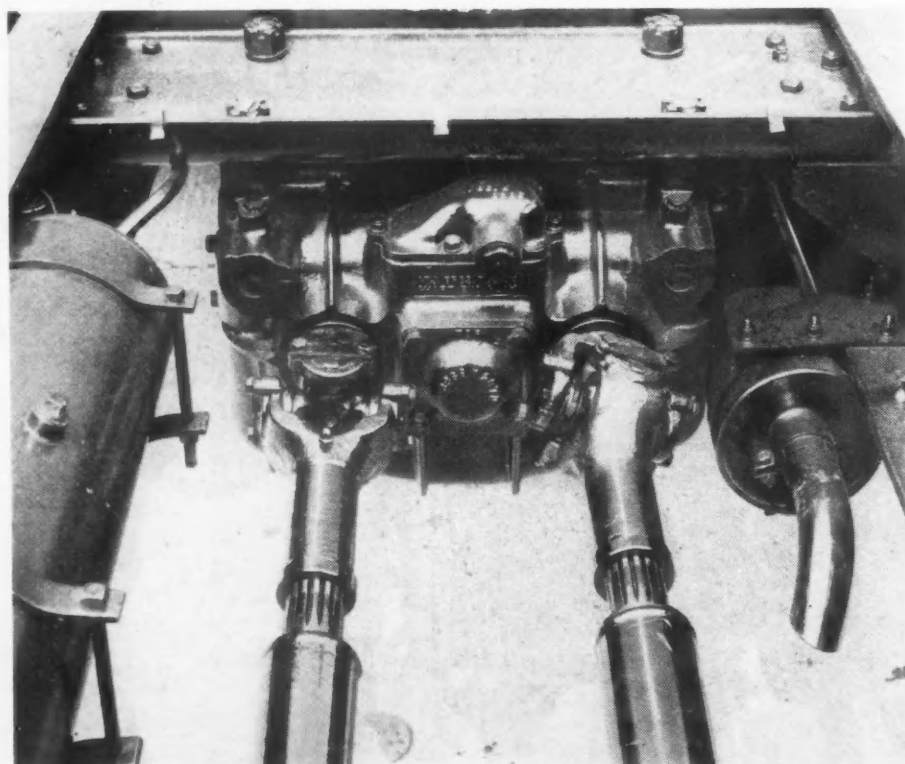
Model	VX-154	VX-172	VX-190
Wheelbase (in.)	154	172	190
CA (in.)	84	102	120
Overall Length (in.)	260 ³ / ₈	284 ¹ / ₂	308 ¹ / ₂
Body Length (ft)	12	14	16
Maximum GVW (lb)	34,000	34,000	34,000
Body and Load (approx. lb)	22,700	22,600	22,480

Dodge Presents

Here is a three-quarter side view of the Dodge six-wheeler.



Close-up of the outlet end of the torque divider showing individual propeller shaft lines to each of two driving axles.

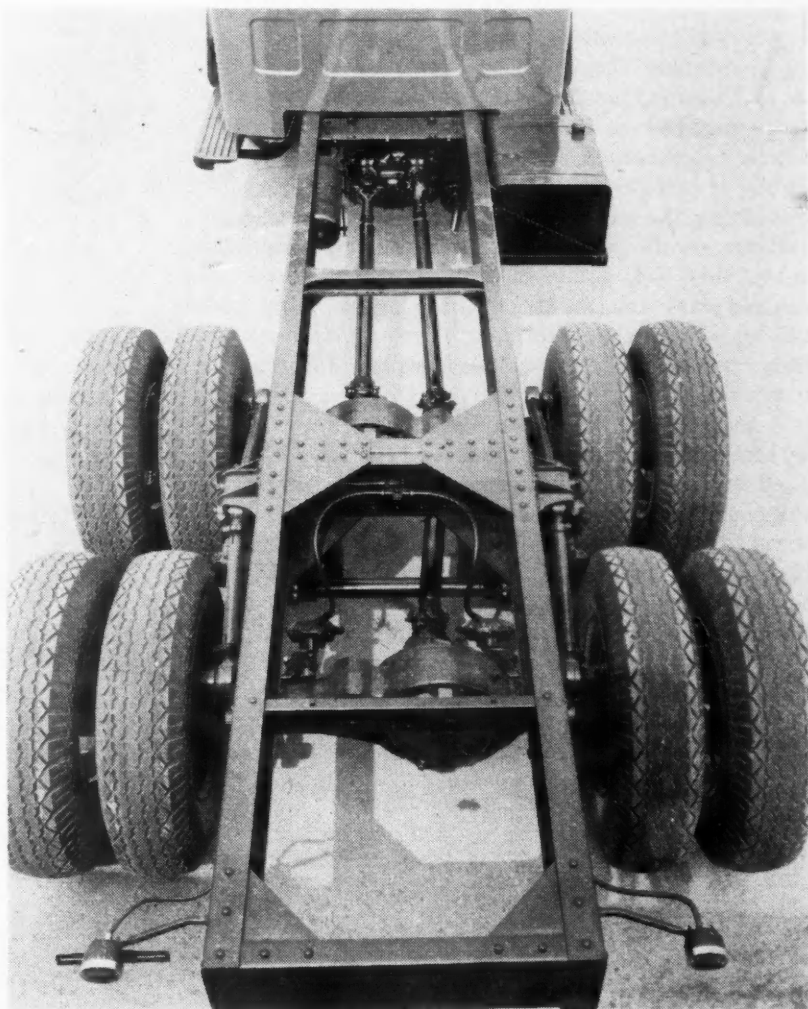


A NEW six-wheel series of motor trucks has been introduced by Dodge Division, Chrysler Corp., the Dodge B-1-VX Model, featuring a tandem drive rear axle arrangement of unique type. Developed by Dodge truck special-equipment engineers, the six-wheelers represent a rugged, heavy duty tandem drive rear axle conversion for the familiar Model "V" Dodge truck series for GVW ratings up to 34,000 lb.

As illustrated in the chassis plan view, the tandem axles are mounted in a special bogie designed for heavy duty service with torque rods arranged in parallelogram form to hold

Its New Six-Wheel Trucks

Plan view of Dodge B-1-VX chassis showing arrangement of tandem axles, propeller shaft drives, and torque divider at the transmission end.



axles in correct alignment under all conditions. The illustration of the drive end shows the arrangement of the two propeller shaft lines running from the torque divider to each axle. It will be noted that the axle housings are offset to accommodate the independent propeller shafts, the line on the left hand side being divided into two sections with a mid-ship bearing in the pillow block of the forward rear axle.

The torque divider permits the drive to each axle to transmit equal torque and is supplied with a high and low gear ratio to meet varying load and road conditions, the choice of ratios being given in the table.

The torque divider ratio is selected by a manual control. This unit also incorporates an inter-axle locking differential which may be locked out at low speeds if desired.

To meet the special operating conditions of the six-wheelers, the frame is fitted with reinforcements of heavy duty outside channel type running full depth to the end of the frame.

Air brakes are standard equipment. Rear spring suspension is of full floating type to equalize the load between the two driving axles.

The engine for this model is the same as for the

basic "V" model, 6-cyl., L-head, 3 $\frac{3}{4}$ in. bore x 5 in. stroke, 331 cu in. displacement, having a maximum bhp of 128 at a governed speed of 3000 rpm.

Standard Specifications of VX-154, VX-172 and VX-190

Fires—Front.....	9.00/20-10P
Tires—Dual Rear.....	9.00/20-10P
Rims—Front.....	7.00
Rims—Rear.....	7.00
Wheels, Disc—Diameter (10-Stud).....	20 in.
Axle, Front, Capacity.....	7,500 lb
Axle, Dual Rear—Single Speed—Combined Capacity.....	28,000 lb
Axle, Dual Rear—Optional Ratio.....	6.83 or 7.8:1
Springs, Front—Nominal Capacity per Spring..	3,500 lb

Springs, Rear—Nominal Capacity per Spring...	12,500 lb
Transmission.....	5 Speeds
Torque Divider—Two Speed (With Inter-Axle Locking Differential)	
Power Ratio.....	1.68:1
Speed Ratio.....	1.22:1
Optional Ratios	
Power Ratio.....	1.68:1
Speed Ratio.....	1.04:1

High Speed Machining of

Self-Contained Automatic Transfer Machines Play

Big Part in Efficient Production at Lincoln Plant

By Joseph Geschelin

AMONG the more striking developments of the 1948 model season was the announcement of Lincoln cars, featuring the new 152-hp V-8 engine. This article is concerned primarily with highlights of unique equipment installed for machining the new cylinder block—one of the largest castings of its kind. As readers of this publication know, this V-8 engine is built in two versions—for Lincoln cars and for trucks, the latter being rated 145-hp. From the standpoint of most major machine shop operations, however, there is little difference between the two.

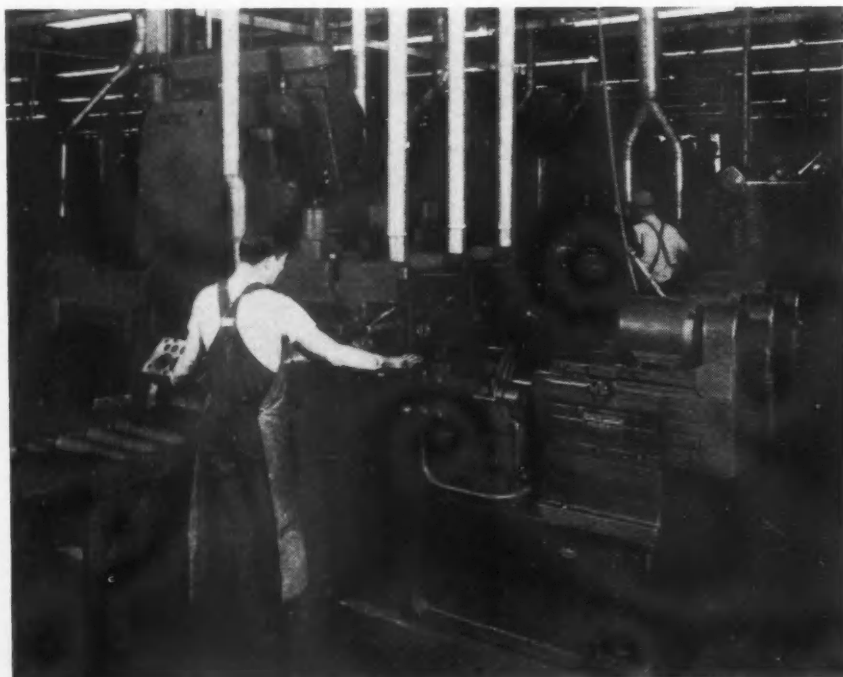
Among the items of equipment to be described are several highly successful transfer type machines supplied by Ingersoll; an enormous and very interesting Hanchett surface grinder; the first example of a high speed, transfer type milling machine developed by Kearney & Trecker; Ex-Cell-O precision boring machines for cylinder bores; and the big eight-spindle Barnesdril honing machine with inclined heads. In addition to the specific machines mentioned here, the plant has many other items of equipment including—Baker, Foote-Burt, Snyder, and Davis & Thompson.

The current trend to transfer type machinery with automatic cycles is well exemplified in the new Lincoln machine shop. The operation may be visualized

as an integration of numerous self-contained transfer machines in which many associated operations are performed automatically. This is done without tying the sequence of individual machines into a continuous automatic cycle. Each of the transfer machines, however, represents a combination of operations performed heretofore in batteries of separate machines, the result being a more compact machine shop set-up, having higher productivity in a smaller compass and with considerably less labor supervision.

In machining a block of this character a major problem is to develop the locating points for subsequent operations in such fashion as to assure an acceptable cylinder wall thickness. With the large foundry tolerances incident to this type of casting the proper alignment of the block in the beginning stages is easily the controlling element of the whole set-up.

The procedure at Lincoln is to survey each rough casting in a gaging fixture before clearing it for initial milling operations, using metal templates for this purpose. The job of the inspector is to line up the locating points cast on the block in conformity with the pattern of the templates laid over the cylinder bores. If necessary the locating bosses are ground to suit. These bosses then serve as locaters in milling the pan face.



Unique three-way Ex-Cell-O transfer machine shown here does the drilling of the hydraulic tappet gallery at three stations. A vertical head for drilling and reaming of the fuel pump shaft hole is in the background.

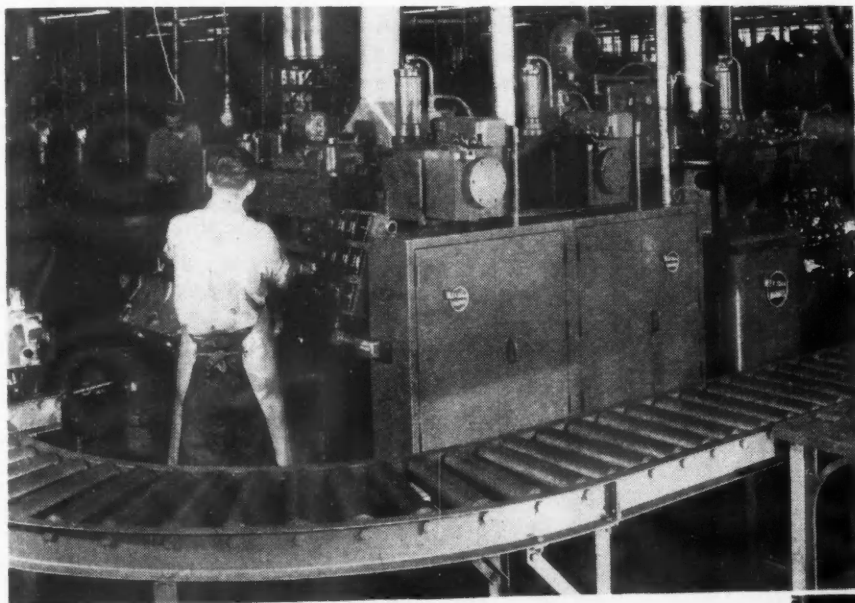
f Large V-8 Cylinder Blocks

After the lower pan face and upper surface have been milled, the block goes to a small Snyder drilling machine for drilling the two dowel locating holes which determine the positioning of the block in all subsequent fixtures. As illustrated, the block is placed in the fixture up-side-down with the bottom pad resting against the upper surface of the fixture. At the same time four locators with curved tips are moved into position, bearing against the inner faces of the cylinder walls of the four extreme end bores. As the locators move into the pre-determined position they

tend to shift the block horizontally until alignment is secured. At this stage the amount of out-of-alignment of the rough casting has been divided equally among four points. When this has been done there is complete assurance that all bores will machine to size without wide variation in wall thickness and without danger of a thin wall at any point.

Actually this machine has a number of spindles in addition to the two large dowel drills. These spindles were added to get some holes "for free" while the dowel holes are being drilled.

Considering the entry of many leading machine tool builders in the field of transfer machines, it is of interest to find what is believed to be the first example of a large Kearney & Trecker automatic transfer mill. Described as a six-spindle shuttle type angular head planer type mill, this machine is designed to mill the



This is a three-station transfer type W. F. & John Barnes boring machine to which blocks are presented following boring in the big tunnel type Ingersoll cam-and-crank boring unit.

Although a simple machine in appearance, the Snyder vertical drill is responsible for one of the basic operations on the Lincoln cylinder block. Its function is to drill the two dowel locator holes in the pan rail in such fashion as to account for foundry variations in all eight bores.



cylinder head surfaces and the exhaust pads at the same time. Two additional heads—to handle the exhaust pads—supplement the main spindles. The machine has a roughing and finishing station, handles two blocks at a time in each station. The shuttle type fixture, interlocked with the cycling of the machine, serves to lock the work for milling, moves the work progressively through the cutting cycle, unclamps the work when the cut has been completed, then returns to the starting point to pick up the next pair of blocks. The movement of the shuttle at the same time takes care of unloading the finished blocks.

Considering the character of the work done by this huge machine, it is impressive to learn that through feed is at the rate of 38 ipm, while surface cutting speed is in excess of 350 fpm. All of the cutters are fitted with cemented-carbide tips.

Oil lines for the hydraulic tappet gallery are drilled in a unique special machine built by Ex-Cell-O. Its function is to drill two $\frac{3}{8}$ -in. oil holes through the push rod bosses; drill the $\frac{9}{16}$ -in. oil line from both ends; drill and ream the fuel pump shaft hole. The long oil lines are drilled progressively in three stages. The machine holds three blocks at a time with three horizontal multiple-spindle heads on one side, two heads on the other, the odd head completing the drill through. In addition, the machine has one vertical head. The cycle is automatic and continuous, requiring manual loading only.

In the present set-up cylinders are bored in an inclined head Ingersoll, then precision bored in a big Ex-Cell-O precision boring machine having inclined heads. This machine handles two blocks at a time, finishing 16 bores for each cycle. The amazing thing about it is that the bores in any block are held to a maximum variation of 0.0003 in. from one another.

Following precision boring the blocks are honed in an interesting eight-spindle Barnesdril honing machine, fitted with hydraulically operated Micromatic hones. A feature of advanced practice is the provision of Airtemp refrigeration units through which the coolant is circulated and held at a constant temperature around 70 F.

Skillful planning has made possible the adoption of an extremely high production machine on a job which normally would not justify the investment. This is the enormous Hanchett surface grinder illustrated here. To justify the machine, the production department selected a group of three parts having sufficient combined volume to keep it going continually. The intake manifold and the timing gear cover require

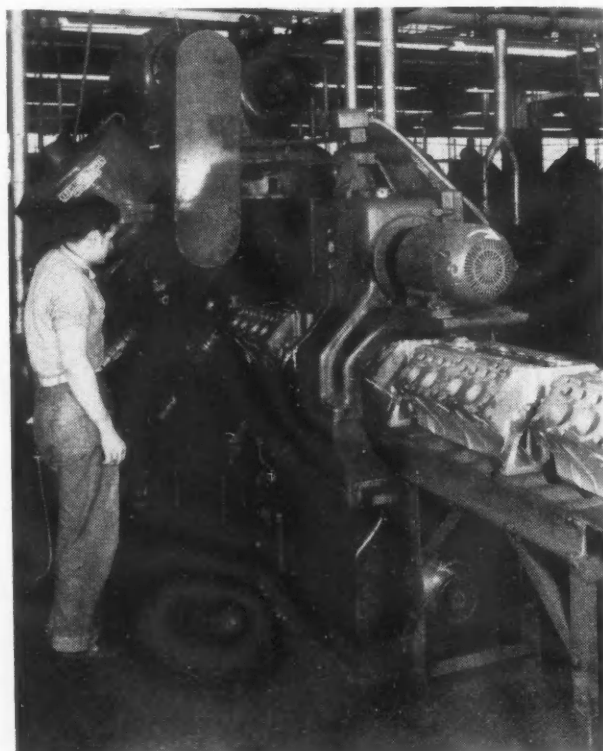
finishing of only one face while the clutch housing is ground on two faces, the latter requiring two passes in the grinder. The machine has the usual large rotary table, this one being fitted with twelve fixtures to accommodate the three different parts. It is provided with five wheel heads for rough and finish grinding of the various faces.

The grinding cycle removes as much as 0.100 in. of stock on each side from the rough casting. On clutch housings it is successful in producing surfaces of excellent quality with flatness and parallelism of 0.002 in.

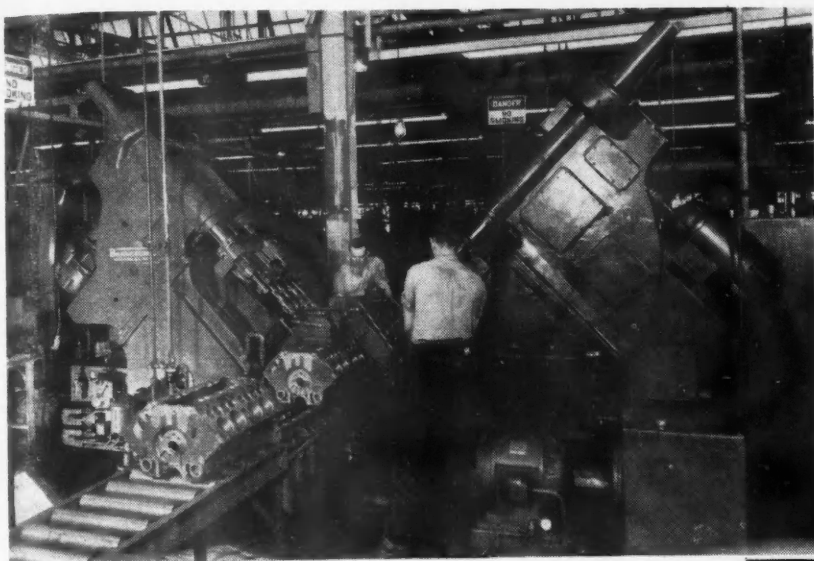
An interesting feature of the Hanchett is the provision for continuous recirculation and filtering of the coolant. This is a sizable installation considering that the machine uses 500 gallons of coolant per minute. The filtering unit is of flotation type in which the fluid is agitated and aerated to bring the impurities to the surface from which the material is skimmed and dumped outside.

The Lincoln management is particularly proud of the long tunnel-type Ingersoll cam-and-crank-boring machine of automatic transfer type. In function it handles the following operations in sequence: rough, semi-finish, and finish-bore the camshaft holes; rough and semi-finish-bore the main bearing line; cut three oil grooves in the camshaft bearing bores; and bore a large diameter hole in the rear end of the block. These operations are done in three double units interconnected by the transfer mechanism.

An unusual wrinkle in the setup is provision of an automatic roll-over fixture immediately following the rough boring station where most of chip removal takes place. The block is pushed into the fixture, automatically rotated to free the casting of loose chips, then automatically moved into the next station. Inci-



So far as we know this is the first example of a Kearney & Trecker shuttle type angular head planer type mill. Installed in the Lincoln plant, it represents the latest development of a transfer type milling machine, handling the rough- and finish-milling of cylinder head banks and exhaust manifold pads. A pair of cutters may be seen at the left near the operator.



Following precision boring in an enormous Ex-Cell-O inclined head machine, blocks go to the eight-spindle inclined head Barnes-drill honing machine for finishing cylinder bores.

The big Hanchett surface grinder mentioned in the text is shown in this view. The rotary table is provided with fixture to accommodate three different parts. The machine has five wheelheads and is served by a special filtering unit.



dentially, the grooving of camshaft bearings eliminates what has been an unusually troublesome operation by conventional methods.

A three-station W. F. & John Barnes machine has been placed in the line to complete the operations after processing in the Ingersoll cam- and crank-bore. This machine handles the following operations—finish flycut main bearings; finish bore two dowel holes in the bell end; finish bore camshaft bushings; finish face and chamfer rear main bearing after caps have been assembled; finish bore oil seal recess.

Among several transfer units installed by Baush, the most interesting is a four-way drilling machine that completes a variety of miscellaneous holes in the intake manifold, promising to reduce the cost of the job materially. The sequence of drilling is as fol-

lows: drill eight angular holes in bottom; drill two holes in carburetor pad; rough- and finish-bore and face two angular filler holes; drill and ream $\frac{3}{8}$ -in. cross hole from both sides; drill and tap four holes in carburetor pad; tap three holes.

Citroen to Announce \$900 Car at Paris Show

Citroen will uncover at the Paris automobile show, opening Oct. 7, a popular passenger car, selling in the neighborhood of \$900, on which experiments and tests have been carried out for the last six years. The car is intended for utility use, with at least 50 miles to the gallon. The Citroen will have front wheel drive and torsion bar suspension all round. With a view to low price, many of the trimmings usually associated with a passenger car have been eliminated.

Road tests on this model were conducted during the whole of the German occupation. It was not included in the five-year plan, the task of producing a

low-priced, mass-production car being given to Renault. Michelin, now having a controlling interest in Citroen, has always been stoutly opposed to State interference in industry, but how he has got over the restrictions on steel supply is not known. To a certain extent the new Citroen will cut into the Renault market. This latter firm is now approaching the 300 per day mark with its rear-engined four-passenger job. Citroen counts on equalling this production with its lower-priced model.

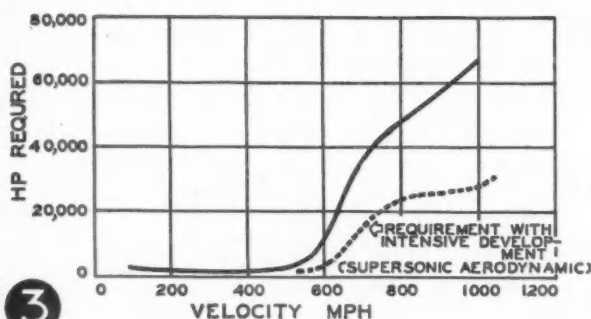
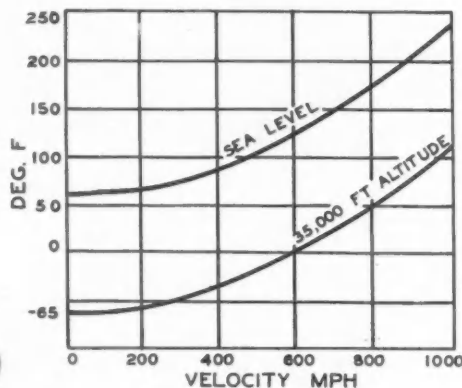
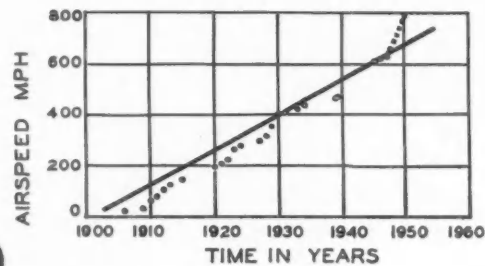
Another new car to be uncovered at the Paris Salon is the Peugeot 203. It has a four-cylinder overhead valve engine with patented hemispheric com-

bustion chamber in Alpax alloy. Front wheels are independently sprung and coil springs are used at the rear. The stroke of the four cylinder motor is less than the bore. The transmission, with under steering wheel shift, provides direct drive on third and overdrive on fourth. Body and chassis are all-metal unit construction. A heater and air conditioning plant is built in. Radio installation is optional. Broad base tires are fitted. Production of this model has been held back a year to allow reconstruction and reequipment of the factory, which was bombed during the war. The schedule calls for 100 per day.

By E. H. Heinemann

Chief Engineer, El Segundo Plant
Douglas Aircraft Co., Inc.
El Segundo, Cal.

Trends in Aircraft



THE research and development requirements of the airplane industry in recent years have been increasing at a rate far beyond our earlier expectations. The object of this article is to illustrate the trend of this increase and to explain some of the problems that account for it.

Fifteen or 20 years ago new airplane designs were developed by small groups of engineers usually numbering considerably less than 100. Only a small fraction of these were technically trained. In recent years the demand for greater performance and higher operating altitudes has required specialists from many other fields. At the present time, nearly every new airplane requires the assistance of as many as 400 or 500 highly trained specialists. Most of these specialists have had formal technical training in the fields of aerodynamics, structural and mechanical engineering, metallurgy, hydraulics, electronics, thermodynamics, ballistics, vibration and flutter, physiology, chemistry, ceramics, and other specialties.

The work of these scientists has been greatly assisted by such agencies as the National Advisory Committee for Aeronautics and other military establishments. In addition, it has become necessary for most

Fig. 1—World's airplane speed records.

Fig. 2—Power required for a present day hypothetical 20,000 lb subsonic airplane at 40,000 ft altitude.

Fig. 3—Temperature rise with increasing velocity.

Research

aircraft manufacturers to establish their own laboratories containing very elaborate equipment such as altitude chambers, hot and cold test chambers, and, in many cases, their own wind tunnels. At present, most of these plant facilities are being utilized full time; often several shifts a day. Aircraft manufacturers are also finding the services of privately operated wind tunnels invaluable. A few of these are, for example, the Sounthern California Cooperative Wind Tunnel at Pasadena, administered by Caltech, and a similar tunnel on the East Coast, administered by Cornell University. As an indication of the worth of these tunnels, they are usually booked up many months in advance and demands for their time far exceed available operating hours.

The constant demand for higher speeds and performance accounts for the greatest portion of our current research effort. Speeds of thousands of mph are now obtainable with rockets and missiles, particularly outside of the earth's atmosphere. High speed flight of inhabited aircraft within the earth's atmosphere is another problem. All indications are that vast amounts of research and development will be required before speeds of 700 and 800 mph can be reached, with inhabited airplanes in the lower atmosphere.

From the foregoing it can be concluded that the future progress of airplane performance will depend largely upon research and development, not only in the immediate field of aviation, but in the many other supporting sciences. This specialization, therefore, will require a much higher degree of training and specialization in our schools and universities. It is also believed apparent that problems yet unsolved will require, in addition to increased facilities and funds, a much greater effort toward long-range planning than has been given these problems in the past.

Reviewing our past progress, Fig. 1, illustrates that in spite of man's best efforts the world's official speed records have increased at a rate of only 14 miles per year during the 45 year history of aviation. The acceleration of jet power and supersonic aerodynamic developments during the war years indicates that an improvement in this

rate of progress might be expected in the near future. While on this chart the yearly speed increase appears small, the problems encountered in holding this rate as the speed of sound is approached become tremendous. Speeds above 600 mph, and altitudes of 35,000 to 50,000 ft are expected of our newer designs. This introduces many new problems. Such aircraft require pressurization, heating, refrigeration, improved oxygen equipment, personnel ejection, survival provisions after ejection, speed control or descent brakes, and many other innovations. In addition, many of our old problems are still with us and are accentuated.

Fig. 2 illustrates one of the biggest problems in increasing airplane speeds—the problem of propulsive power. This curve indicates how drag increases with speed and shows, for example, that a hypothetical 20,000 lb airplane of modern design, operating at 40,000 ft altitude and speeds of 700 to 800 mph, would require power far beyond present day physical possibilities. The second curve or dotted line indicates how power requirements may be expected to be reduced during the next 10 years or so by means of

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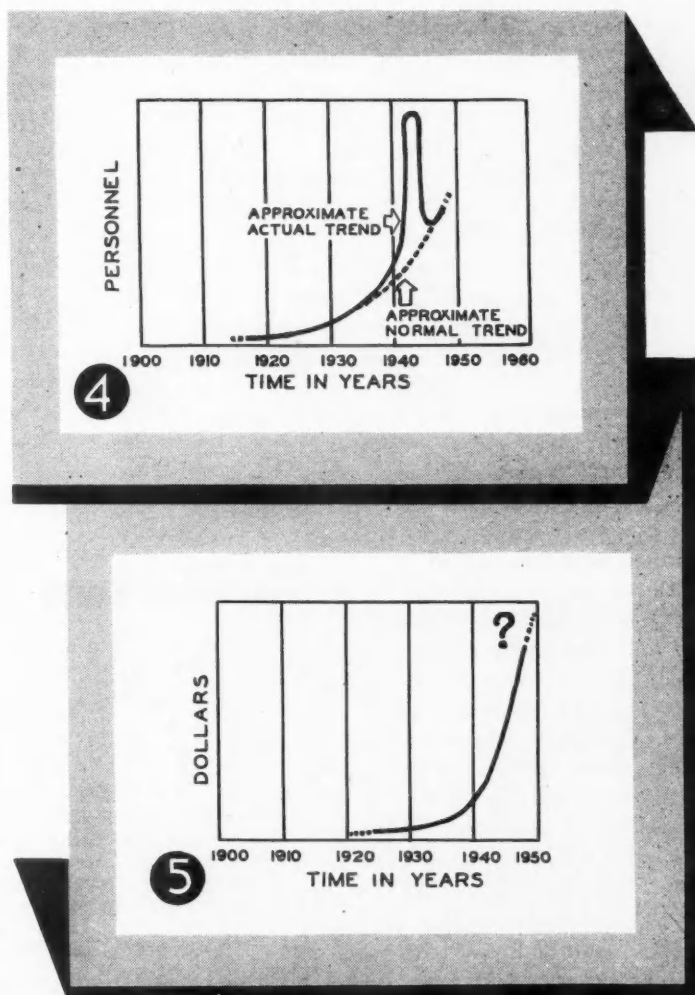
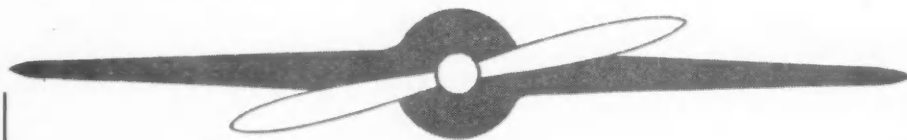


Fig. 4—Approximate trend in engineering employment.

Fig. 5—Approximate trend in cost for developing one experimental airplane.

More Original Designs Would



Bendix Trophy Race

"R" Division

Long Beach, Calif. to Cleveland, Ohio: 2044.37 miles

Place	Pilot	Airplane	Engine	Time	Speed	Prize
First	Paul A. Mantz	North American P-51	Packard V-1650	4:33:48.7	447.980	\$10,000
Second	Linton B. Carney	North American P-51	Packard V-1650	4:34:57.5	446.112	5,500
Third	Jacqueline Cochran	North American P-51	Packard V-1650	4:35:07.3	445.847	4,000
Fourth	Edmund P. Lunken	North American P-51	Packard V-1650	4:37:46.3	441.594	2,500
Fifth	Jesse F. Stallings	DeHavilland Mosquito	Packard V-1650	5:59:35.2	341.120	1,500

"J" Division

Place	Pilot	Airplane	Engine	Time	Speed	Prize
First	Ens. R. E. Brown	North American FJ-1	Allison J-35	4:10:34.4	489.526	
Second	Cdr. E. P. Aurand	North American FJ-1	Allison J-35	4:13:04.9	484.674	
Third	Lt. E. R. Hanks	North American FJ-1	Allison J-35	4:15:53.3	479.358	
Fourth	Ens. R. E. Oechalin	North American FJ-1	Allison J-35	4:20:44.4	470.439	

By
Robert
McLarren

nically colorless due to the continued exclusive possession of this field by surplus fighter aircraft. The North American P-51 Mustang fighter dominated these events with its 450 mph top speed, its good handling characteristics and its ready availability. The Bell P-63 King Cobra won one event and placed in

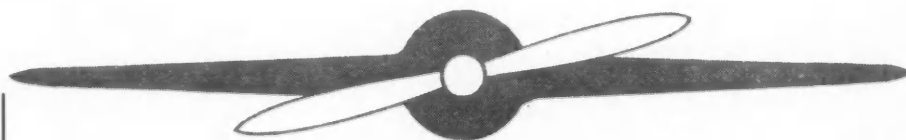
several others and three Lockheed P-38 Lightning fighters were entered. However, there are few who dare "tinker" structurally with these highly loaded aircraft other than some cautious wing clipping, permissible through the greatly reduced weight by the removal of military equipment.

These races narrowed down to contests of power plants and in this respect were truly flying test stands with few engines sustaining the astonishing loads placed on them. Charles Brown, who led the famed Thompson Trophy Race for 19 of the 20 laps, actually forced 122 in. manifold pressure from his Allison V-1710 engine, a figure that would make any power plant engineer shudder. Engine speeds of 3300 rpm and the use of constant water-injection are indicative

As a result of combat aircraft dominance of the high horsepower events, National Air Race officials met following the recent 1948 classic at Cleveland to discuss plans for a new event patterned after the Goodyear Trophy Race but to feature aircraft powered by engines of less than 1350 cu in. displacement (about 450 hp) and which could be built for about \$5000. This would return the races to their prewar technical interest when the famed Wedell-Williams, Gee-Bee and Turner-Laird original designs featured the Thompson and other events. Most observers believe that in addition to piloting skill the races should provide rewards for engineering and design prowess which is lacking in the use of surplus fighter aircraft.

In many instances this year's races proved a grueling test of engine endurance that few passed, a battle of design skills won by aerodynamic knowledge and an opportunity for the American citizen to witness military secrets laid bare. The races were free of tragedy, replete with thrills and with technical innovations, meeting in full the formula for America's Classic of the Air.

The "senior" events can only be described as tech-



Soho Handicap Trophy Race

Seven laps of 15-mile course: 105 miles

Place	Pilot	Airplane	Engine	Time	Speed	Prize
First	Robert I. Eucker	Bell P-63	Allison V-1710	19:40.44	320.220	\$3,150
Second	Howard S. Gidovlenko	Lockheed P-38	Allison V-1710	19:48.88	317.952	1,750
Third	Charles C. Walling, Jr.	North American P-51	Packard V-1650	19:52.89	316.877	1,050
Fourth	Bruce E. Raymond	North American P-51	Packard V-1650	19:57.63	315.823	700
Fifth	Charles W. Bing (*)	North American P-51	Packard V-1650	20:07.89	312.942	850

(*) Prize money includes \$500 for fastest lap, No. 3 at 395.564 mph.

Help National Air Races

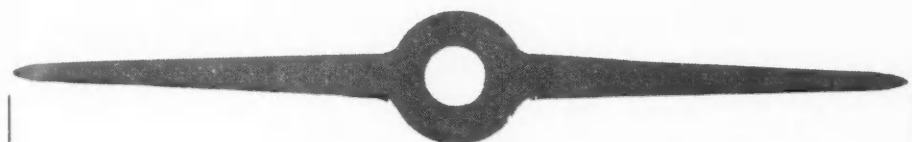
of the trial afforded these engines as mentioned.

But as tests of aircraft and engines, a brief list of the failures is of technical interest. The two favored entrants in the Thompson event, Goodyear F2G-1 Corsair fighters powered by Pratt & Whitney R-4360 Wasp Major engines producing nearly 4000 hp, came down in the second and fifth laps both with air intake cowl failures. Cook Cleland and Dick Becker, pilots, had fashioned long air inlets flush with the cowl

Brown, who appeared to be a sure winner of the race from the very first lap. Brown, an Allison test pilot, had equipped his Bell P-39 Airacobra fighter with an Allison V-1710-F engine, larger than used in the wartime version of the plane, under the direction of Don Nolan, Allison engineer. To provide proper cooling, an extra cooler had been installed below the fuselage belly. A fuselage crack just aft of the engine exhaust stacks had allowed the hot exhaust to flow

against a fuel line, aerating the fuel and providing only vapor to the carburetor causing the engine to lose power suddenly and forcing Brown to land with a dead stick. On examination, however, Nolan discovered that the supercharger diffuser had failed resulting in engine power loss. As always, special fuel blends were a much discussed and whispered topic around the hangars but much of the mystery was removed this year by the appearance of a special synthetic fuel furnished

Thompson Trophy Race entrants. Shell Oil Co. chemists developed Shell Methyl Triptane-1 and made it available to all entrants, although only six of the ten entrants availed themselves of the opportunity, the others preferring their own blends of 115/130 octane with various hydrocarbons added. SMT-1 was pre-



Allison Jet Trophy Race

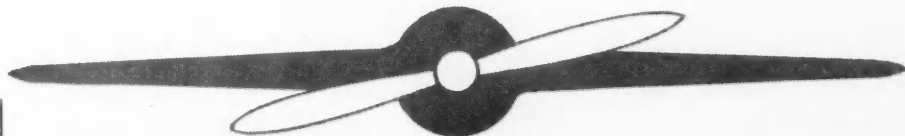
Indianapolis to Cleveland: 259.980

Place	Pilot	Airplane	Engine	Time	Speed
First	Lt. L. E. Thompson, Jr.	North American FJ-1	Allison J-35	31:47.1	490.703
Second	Lt. A. E. Nauman	North American FJ-1	Allison J-35	33:46.4	461.814
Third	Lt. Cmdr. A. B. Conner, Jr.	North American FJ-1	Allison J-35	33:59.1	458.938

Note: All entrants had to attain 30,000 ft. altitude en route.

leading edge and extending aft to the carburetor inlet at the rear of the skirt section and had riveted these units in place. The air loads had created a combination of external low pressure and internal high pressure that pulled the inlets loose from the cowl, although they both landed before either inlet sheared loose and flew back into the canopy. In the fifth lap Robert Eucker, who had previously won the Sohio Trophy in his Bell P-63, noticed his engine heating up and pulled out in the sixth lap with a ruptured coolant radiator. M. W. Fairbrother, flying a North American P-51, pulled out in the 12th lap when his engine-driven fuel pump malfunctioned. C. C. Walling, also flying a North American P-51, pulled out in the 19th lap when he ran out of water for injection.

Most complex difficulty was experienced by Charles



Goodyear Trophy Race

12 laps of 2-mile course: 24 miles

Place	Pilot	Airplane	Time	Speed	Prize
First	Herman R. Salmon	Cosmic Wind	8:29.41	169.608	\$7,000
Second	Sylvester J. Wittman	Wittman Special	8:31.66	168.862	4,000
Third	Arthur C. Chester	Chester Special	8:33.67	168.201	2,200
Fourth	William Brennan	Wittman Special	8:37.17	167.063	1,100
Fifth	Billie Robinson	Cosmic Wind	8:43.30	165.106	900
Sixth	Paul G. Quigley	Pitts Special	8:43.98	164.892	750
Seventh	Robert B. Downey	Cosmic Wind	8:55.14	161.453	650
Eighth	William L. LeFevers	Falcon Special	9:11.78	156.584	600

Note: All entrants powered by Continental, 85 hp engine.



Thompson Trophy Race

20 Laps over 15-mile course: 300 miles

Place	Pilot	Airplane	Engine	Time	Speed	Prize
First	Anson L. Johnson	North American P-51	Packard V-1650	48:51.21	383.767	\$16,500
Second	Bruce E. Raymond	North American P-51	Packard V-1650	49:17.01	385.234	8,000
Third	Wilson V. Newhall	Bell P-63	Allison V-1710	57:24.24	313.567	4,500
(*)	Charles E. Brown	Bell P-39	Allison V-1710			1,300
(*)	Cook Cleland	Goodyear F2G	P&W R-4380			200

(*) Prize money represents \$100 for each fastest lap, although neither finished race.

pared as a special engine test fuel by the Shell group with a theoretical 200 octane rating, although this figure was a much debated point. Only a few thousand gallons of the blend were made for the event and the contestant agreed to provide technical data on its performance within the limits of instruments carried in the planes.

Goodyear Trophy Race

As before, the Goodyear event attracted the only original design in the National Air Races with 43 different airplanes readied for the event and 23 actually entering the various heats. The winners were decided on the basis of a series of four heat races, two semi-final races, a final and a consolation race with theoretical prize money ranging from \$7000 for first place to \$100 for 32d place, the latter, of course, not materializing.

Goodyear winner was Herman R. "Fish" Salmon, Lockheed test pilot, and a "Tony LeVier Associate," builders of the all-metal "Cosmic Wind" series of

racers. Salmon won third place in the 1947 Goodyear and had made considerable modifications to his plane including an exceptionally fine molded plastic canopy, wheel pants and improved power plant layout. His bronze-painted, low-wing monoplane was never headed throughout the various heats. It has a span of 19 ft and is 20 ft long, and follows standard combat aircraft construction. Two other "Cosmic Wind" racers were entered, one flown by Bob Downey

and another by Billie Robinson, the latter plane owned by "Tony" LeVier, who was forbidden to race this year by Lockheed Aircraft Corp., where he is chief engineering test pilot. Both these aircraft finished "in the money," Robinson winning fifth place and Downey



Tinnerman International Trophy Race

Seven laps over 15-mile course: 105 miles

Place	Pilot	Airplane	Engine	Time	Speed	Prize
First	Bruce E. Raymond	North American P-51	Packard V-1650	17:23.49	382.245	\$3,150
Second	Robert I. Eucker	Bell P-63	Allison V-1710	17:23.93	382.093	1,750
Third	Wilson V. Newhall	Bell P-63	Allison V-1710	20:03.35	314.129	1,050
(*)	M. W. Fairbrother	North American P-51	Packard V-1650			500

(*) Prize money represents \$500 for fastest lap, No. 2 at 378.841 mph.

seventh.

These airplanes are a far-cry from the "backyard" designs popularized by the Goodyear race and represent maximum standards of design and construction. There is little doubt that they can meet license requirements for a specialized private sport plane and are one of the instances of air racing's contribution to aircraft progress.

Second place winner was venerable Sylvester "Steve" Wittman, who hasn't missed an air race entry in the 19-year history of their present form. Steve built a duplicate of his 1947 Goodyear-winning design and flew it himself to second-place money, nosing out William Brennand, his

(Turn to page 64, please)

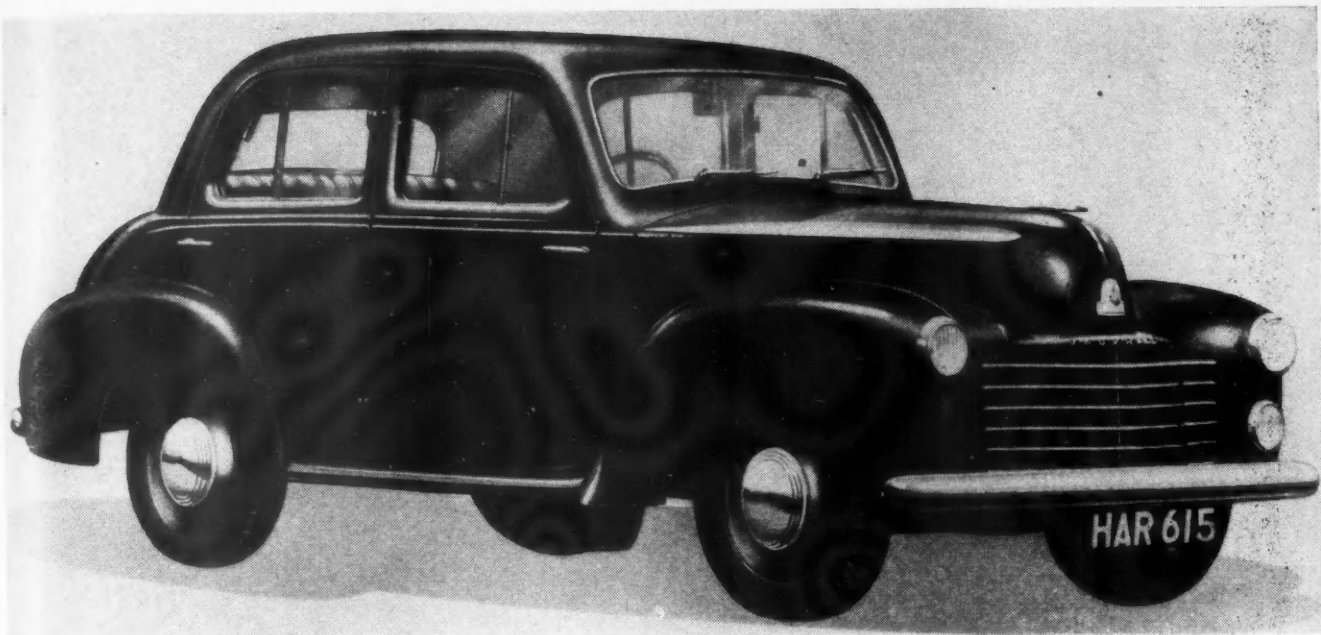


Kendall Trophy Race

Five laps over 15-mile course: 75 miles

Place	Pilot	Airplane	Engine	Time	Speed	Prize
First	Mrs. Grace Harris (*)	North American AT-6	P&W R-1340	19:09.12	234.962	\$2,750
Second	Katherine H. Landry	North American SNJ-3	P&W R-1340	20:34.24	218.758	1,250
Third	Mrs. Dot Lemon	North American AT-6	P&W R-1340	20:34.70	218.677	750
Fourth	Betty J. Clark	North American AT-6	P&W R-1340	20:52.38	215.593	500
Fifth	Nancy A. Corrigan	North American AT-6	P&W R-1340	21:00.14	214.262	250

(*) Prize money includes \$500 for fastest lap, No. 2 at 238.221 mph.



Vauxhall "Wyvern" four-cylinder sedan.

Two New Vauxhall Models

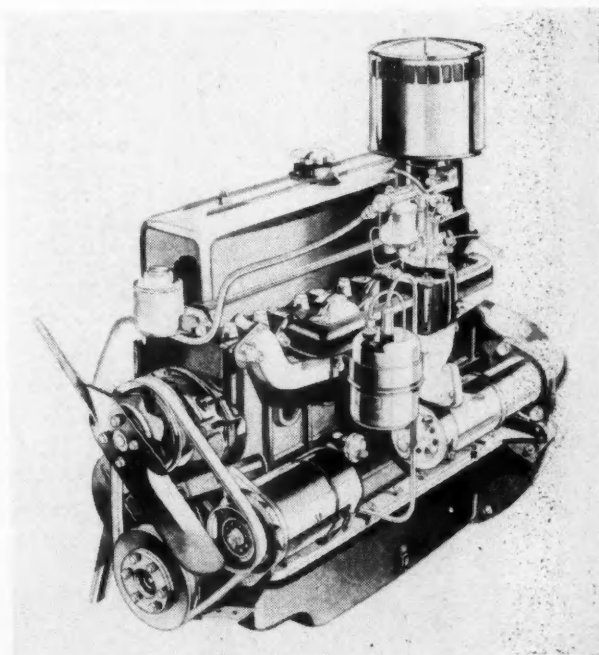
AFTER re-tooling at a cost of more than two and a half million dollars, Vauxhall Motors (British subsidiary of General Motors) is now in production on two new models. Five days after the Luton plant opened, it had reached a capacity of 100 passenger cars per day. The new cars are a six cylinder and a four, each of 2.736 in. bore, the stroke being 3.94 in. for the six cylinder engine and 3.74 in. for the four. The piston displacement is thus 138.8 cu in. and 88 cu in. Compression ratio is 6.75 for the larger engine and 6.4 for the smaller. Maximum brake horsepower for the six is 55 at 3300 rpm, with a maximum torque of 106 lb-ft at 1200 rpm. The four develops 35 hp at 3600 rpm with a maximum torque of 68 lb-ft at 2000 rpm.

Selling price for the six-cylinder Velox sedan is £1720 and for the four-cylinder Wyvern sedan £1400. Purchase tax has to be added for the home market. These prices put the Vauxhall lower than any other similar car so far announced on the British market. These cars are a direct attempt to meet the national export drive and to take advantage of the new £40 flat rate tax system. The program provides for 75 per cent of the output being exported.

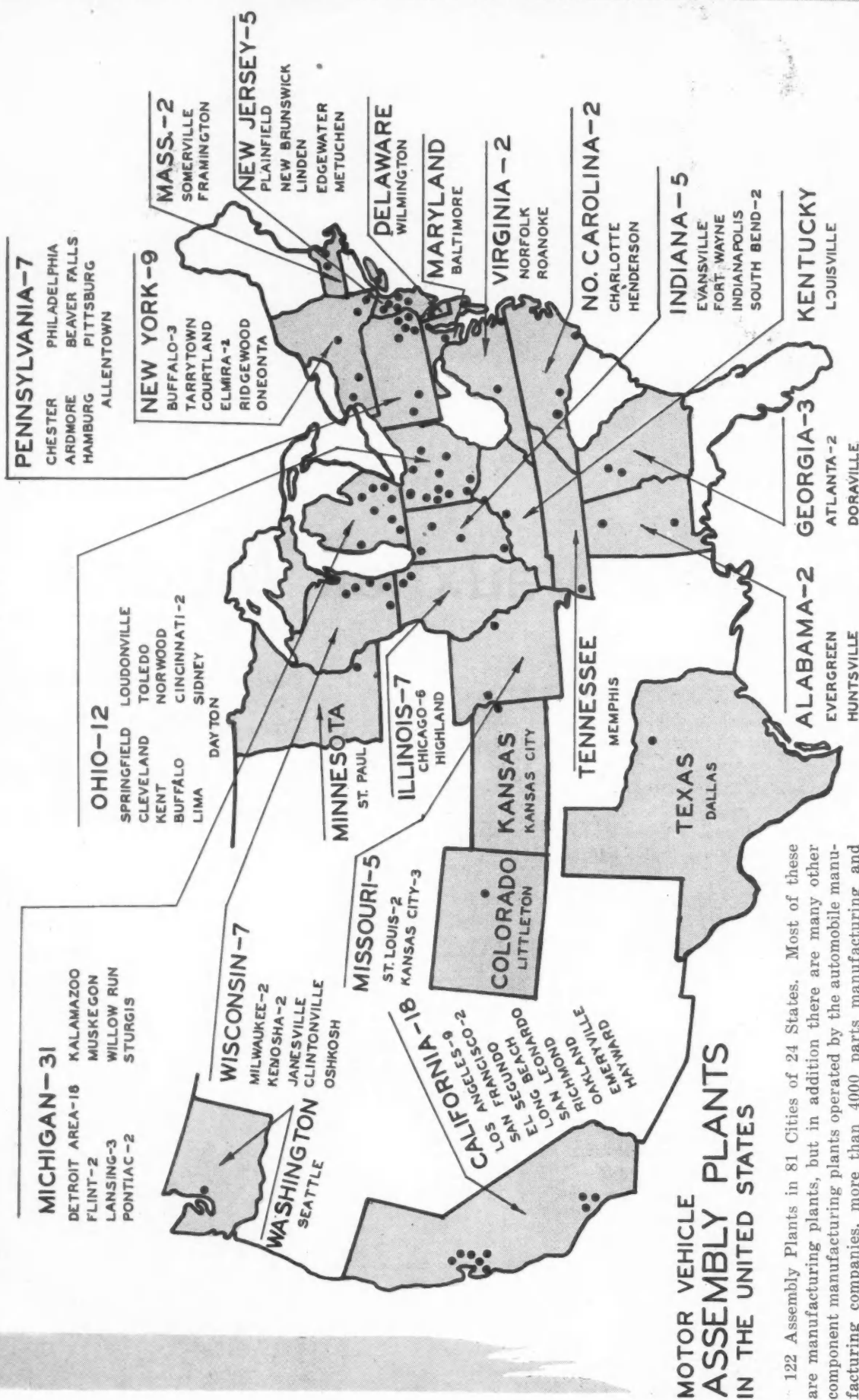
Features of the six-cylinder engine are a four-bearing crankshaft, and a cast-iron head carrying vertical

(Turn to page 92, please)

**Designed for Export Drive and to
Take Advantage of Flat Rate Tax
System, They Are Priced Below
Similar Cars on British Market**



The Vauxhall "Velox" six-cylinder, overhead valve engine which develops approximately 55 hp at 3300 rpm.



122 Assembly Plants in 81 Cities of 24 States. Most of these are manufacturing plants, but in addition there are many other component manufacturing plants operated by the automobile manufacturing companies, more than 4000 parts manufacturing and accessory plants, and 20,000 other firms that sell materials, supplies and services to the automobile industry, America's leading manufacturing industry.

LOCATION OF

[illegible]



The Austrian Porsche, a Glamorized Volkswagen

Special to AUTOMOTIVE INDUSTRIES

VIENNA—After 40 years of designing passenger cars in Europe, during which time he was responsible for the successful Austro-Daimler cars before 1914, later became chief engineer of Mercedes and then in the Thirties designed Auto Union rear engine race cars and the well-known Volkswagen, Dr. Ferdinand Porsche has entered the automobile manufacturing business with a lightweight car bearing his name and incorporating a number of special design features. The factory is located at Gmund in Austria, about 75 miles northwest of this city.

The new Porsche sports car, type 356, is a spacious two-seater and the most striking feature is its low chassis and streamlined body. Maximum speed is about 87 mph. It is powered by the flat four-cylinder, air-cooled Volkswagen engine (see *AUTOMOTIVE INDUSTRIES*, April 15, 1944), located at the rear, having 15 per cent greater piston displacement than the original 24-hp version and equipped with special intake mani-

folds and two downdraft carburetors that increase its peak output to 40 hp at 4000 rpm. Its transmission is the four-speed type.

All wheels are independently sprung. It has the same oscillating rear axle and torsion bar rear suspension as the Volkswagen. At the front the suspension is the Porsche trailing-link torsion bar system. The chassis frame and body floor and pillars are of integral construction. Body panels are made of aluminum alloy.

The convertible illustrated here, equipped with a small fabric top lowered behind the seat, is a prototype. For a production model the company intends to build a coupe. The total weight of the car with two passengers, 66 lb of luggage and a full tank of gasoline,

(Turn to page 60, please)



*The Porsche sports car,
being built in Austria*



A-90 Atlantic convertible with electrically-operated top.

Here Are the New Models to Be Introduced at Paris and London Shows. A-90 Atlantic, All-Steel Convertible with Electrically - Operated Top, Designed for U.S. Market

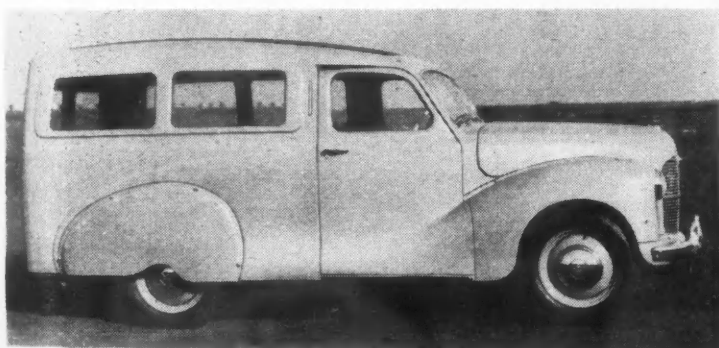
Special to AUTOMOTIVE INDUSTRIES

LONDON—British Austin has revealed its new models which will be presented to the public for the first time at the Paris Salon and later at the London show. The A-70 Hampshire sedan and the A-90 Atlantic have new chassis, although they are of the same general design as the models brought out a year ago. The A-40 Countryman station wagon and the A-40 Pickup are additions to the A-40 passenger car model line.

The A-90 Atlantic obviously has been designed for the American market and more closely follows American styling than any car yet produced in Europe. It is

powered by a four-cylinder engine of 3.4375 in. bore by 4.375 in. stroke (162.2 cu in.) with overhead valves, a compression ratio of 7.5, developing 88 hp at 4000 rpm and having maximum torque of 140 lb-ft at 2500 rpm. Some of the features of the engine are three "Thinwall" main bearings, duplex roller chain for camshaft drive, with a tensioner ring of synthetic rubber, jet lubrication to cylinder walls, flexible inclined "live" rubber mountings front and rear, with an integral torque reaction stop at front and an adjustable locking unit at rear.

The transmission provides four speeds, with steering column shift. The reverse
(Turn to page 94, please)



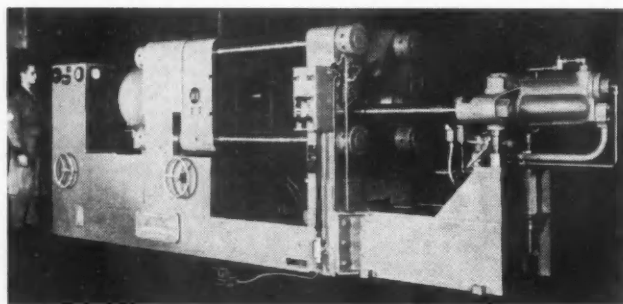
(Above) Countryman station wagon on A-40 chassis.

(Right) A-70 Hampshire four-door sedan with sliding roof.



M-72—Die Casting Hydraulic Unit

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has brought out a new "cold chamber" machine which is a large, self-contained, all-hydraulic unit for the production of die castings of aluminum, magnesium and copper base alloys. Aluminum castings weighing up to 10 lb each can be mass produced with this machine. A typical production example is an intricate 5 lb aluminum casting of large area produced on an average 40 second cycle by application of sustained injection pressures through the cold chamber injection system, and by confining these pressures, which are high, within the die cavities. This keeps porosity at an absolute minimum.



Hydraulic Press Mfg. Co.'s die casting machine

Features incorporated, not available in the preceding model, include a clearance below the die space mounting to accommodate core pulls attached to the bottom of the die; adjustable vertical position of the injection assembly, permitting injection at either the centerline of the machine or 6 in. below center; a doubling of injection speed from 100 fpm to 200 fpm without use of additional motors; and a combination electric and hydraulic interlock control which prevents the die clamp from accidentally closing due to electrical switch failure.

The HPM hydraulic die clamp, consisting of a double acting ram equipped with a small internal booster ram, closes rapidly and provides positive clamping of the die halves for smooth, uniform castings with minimum of flash and porosity. The die clamp is adjustable to any position within the limit of the clamp ram travel. The die opening and closing are free from shock. The hydraulic injection consists of a double acting ram which actuates an injection plunger that delivers molten metal from the cold chamber into the die cavities.

The operator starts each cycle by turning the die clamp operating switch. After hand ladling the molten metal into the injection chamber, the injection cycle is started by operating a foot switch. Balance of the cycle is automatic, including "dwell" or chilling time, actuation of core pulling cylin-

NEW Production and Plant EQUIPMENT

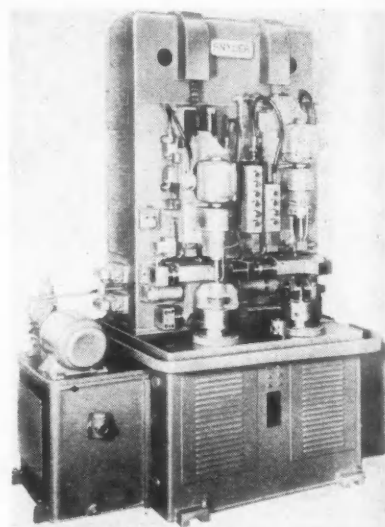
For additional information regarding any of these items, please use coupon on page 54.

ders, die opening, and the ejection of the casting.

This new HPM die casting machine

M-74—Piston Driller and Facer

A special purpose machine, designed and built by Snyder Tool & Engineering Co., Detroit, Mich., for center drilling and facing automotive pistons, enables an unskilled operator to process 444 pistons an hour at 85 per cent efficiency,



Snyder machine for center drilling and facing automotive pistons

according to the manufacturers. Required floor space is 50 in. by 44 in.

The operation consists of center drilling the head end of the piston and facing a portion of the piston head, these surfaces then serving as locating points for succeeding operations.

The machine is equipped with two Snyder standard, hydraulically actuated slide units carrying single spindle heads use for the center drilling operation. Facing slides and tool blocks are mounted on the face of the machine column and are hydraulically actuated in horizontal position.

Two rotating four-jawed chucks are mounted in the machine base directly beneath the centering spindles, two of the four jaws having radial locators. Jaws are hydraulically actuated. Chucks are equipped with a height locator which contacts the inside of the piston head and establishes a controlled thickness during the top facing operation.

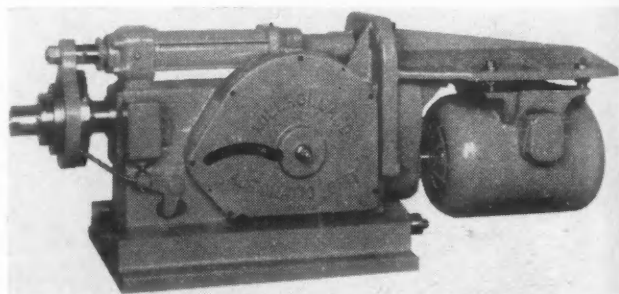
Each cross slide carrying tool block has independent hydraulic feed system

M-73—Automatic Driller and Miller

Redesigned No. 5 Millholland automatic unit for drilling, tapping and milling, brought out by the W. K. Millholland Machinery Co., Indianapolis, Ind., is mounted in an adjustable sub-base with 7½ hp motor drive.

Stroke is 6 in. maximum with motor drive rated at 5 to 10 hp. Spindle is No. 5 Morse Taper or arranged for multiple head drive. Feed is rapid advance, numerous feeds, with dwell and rapid return available. Weight is 1200 lb.

Its automatic cycle is claimed to keep tools actually producing 80 to 85 per cent of working time.



Millholland automatic drilling, tapping and milling unit.

which permits the operator to load and unload a piston in one side of the machine while the opposite side is machining a piston.

Spindles and chucks are driven through "V" belts and sheaves which are easily changed to alter the rpm of each. Feed rates of center drill and facing slides are adjustable through feed control valves and centering spindles.

Base and column are welded steel, thoroughly normalized and properly ribbed for rigidity. A hydraulic pump and tank unit are mounted on one side of the base and a coolant tank and chip tray on the opposite side.

Chucks and centering spindles are driven by individual motors.

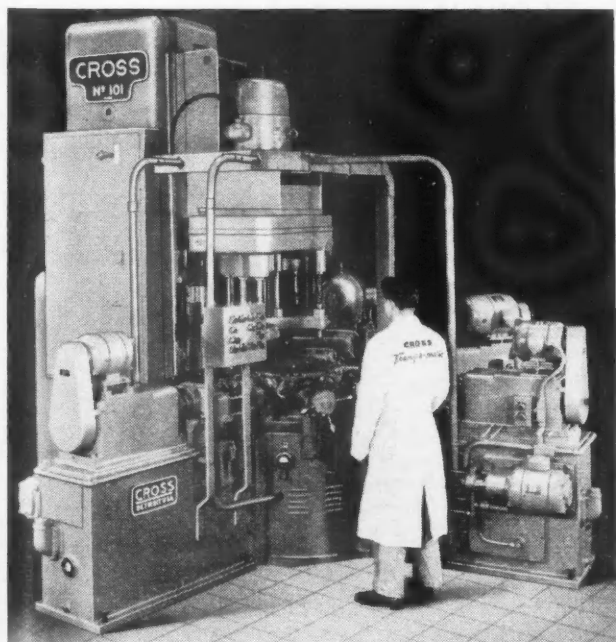
M-75—Driller for Valve Rocker-Shaft Brackets

Because it processes clusters of four parts cast in a single piece, a new and unique special machine just introduced by the Cross Co., Detroit, Mich., facilitates both finishing and handling.

A total of 150 sets, or 600 individual valve rocker shaft brackets are drilled and reamed hourly by a single operator. Ten holes are finished in each casting.

The new machine consists of a seven station, power-operated, index table. Loading and unloading are accomplished at an independent station while the machine is cutting two clusters of four parts each in every one of six working stations. Thus, 12 sets of 48 parts are machined at one time progressively. Feed is hydraulically controlled.

Maintenance costs are claimed kept at a minimum because of many standardized parts, because of the accessibility of wearing parts, and because of the interchangeability of self-contained units. Flexibility for part design changes is provided by use of standard Cross columns, heads, and index table.



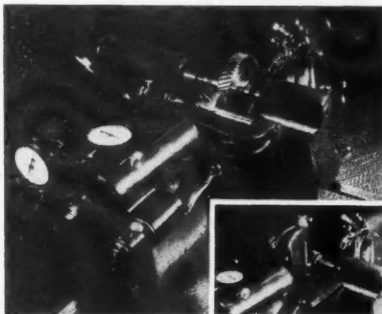
Cross special machine processes clusters of four parts cast in a single piece.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 54.

M-76—New Red Ring Gear Checker

A new Red Ring checking head has been built by National Broach & Machine Co., Detroit, Mich., to determine the helix angle wobble of a gear, its size, eccentricity and roughness of roll,



Red Ring checking head

simultaneously or separately, by rolling the work gear with a master gear under predetermined pressure.

The spindle which carries the master gear holder is mounted in a yoke which may be rotated through 90 deg. Thus, either conventional or 90 deg drive gears may be checked with the same facility.

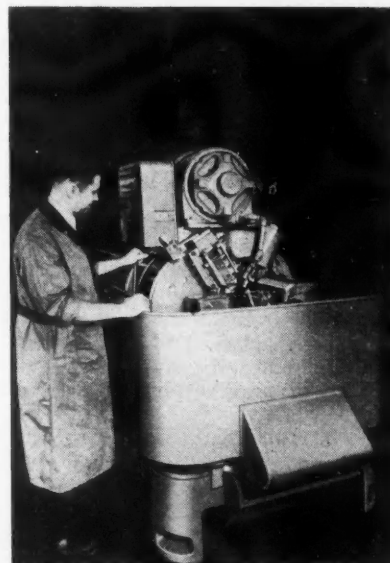
This spindle is so mounted that when the two gears are under uniform spring loaded contact, it is very sensitive to both axial and radial displacement. Such displacements when the gears are rolled together are measured by precision dial indicators located on the head behind the spindle yoke.

This new head may be used on any of the standard Red Ring gear checkers. The head shown at the extreme right in the photo is used for checking index or tooth spacing.

M-77—Single Spindle Automatic Machine

A single spindle automatic machine for the manufacture of parts from tubing in sizes 2 in., 3 in., 6 in., is being marketed by The National Acme Co., Cleveland, Ohio. Rather than an all-purpose machine, it is particularly suited to fast, accurate output on parts made from tubing where simple operations such as turning, forming, straight or taper boring and cut-off are required in mass quantities.

The heavy work spindle is supported in a double anti-friction bearing at each end, and is direct driven by means of sheaves, V-belt connected to motor. By changing sheaves, spindle speeds range from direct with 1800 rpm motor, down to 900; with 1200 rpm



National Acme single spindle automatic machine for tubing parts

motor, down to 600, for 50 cycle 1450 rpm motor, to 725 rpm. When a greater variety of speeds are needed to accommodate short run jobs, spindle change gears can be provided in a modified machine frame.

Feed control is through standard disc

clutch and lever. As a convenience and safety feature useful to the operator when setting up, or in the event of a tool jam, pushing a button allows the operator to throw the feed lever to engage a reversing clutch which returns the slides to their retracted positions and frees the tools in a fraction of a second.

M-78—Motorized Welding Hand Truck

A battery powered motorized hand truck—the Transwelder—which is used to carry welding equipment from one part of a factory to another with maximum efficiency has been developed by



Atco battery powered Transwelder

the Automatic Transportation Co., Chicago, Ill. An adaptation of the Transporter electric hand truck, the Transwelder consists of a Transporter chassis, plus a rack in which are mounted all tanks, rods, tools, and essential equipment for acetylene welding. Space is provided for a fire extinguisher. In addition, the unit pulls the electric welder.

M-79—Low Speed Air Screw Driver

A new line of low speed, high-torque air screw drivers and nut setters is announced by The Aro Equipment Corp., Bryan, Ohio, comprising 12 new models (Nos. 7060 to 7071* incl.) in a range from 450 to 1100 rpm. This includes pistol type and lever type air tools with a choice of positive clutch or friction clutch.

The introduction of slow speed screw drivers and nut setters meets a long felt need in assembly operations, affording a number of advantages. (1) These tools provide a higher driving torque—so that larger size screws and nuts can be driven. For example—the tools will drive ¼ in. screws and bolts at higher speeds, but will handle up to

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 54.

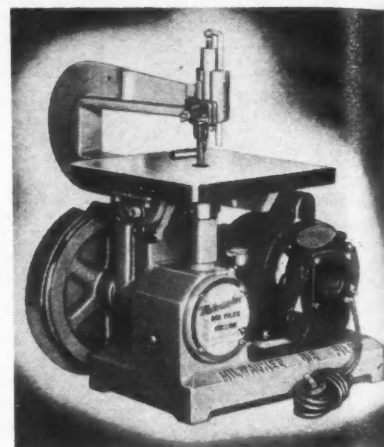
5/16 in. bolt size at slow speed of 450 rpm. Also, better driving of wood screws is assured by the high torque developed at slow speed.

(2) Slow speed saves bits. At slower speed, bit finds the screw slot easier and does not "chew" the head of the screw. (3) Attachments, particularly clutch jams, will last longer due to slower ratcheting of the jaws. (4) Slow speeds of 450 to 750 rpm are particularly suited to self tapping screws and cross recessed head screws.

Standard equipment with the tools includes 8 ft of ¼ in. hose and fittings, one finder and 3 bits as specified. A suspension bale is furnished on all lever models.

M-80—Bench-Type Filing Machine

A new bench-type reciprocal filing machine, Model FS, brought out by the Rice Pump & Machine Co., Milwaukee, Wis., performs all three die making operations—filing, sawing, and lapping—without changing overarms. Its deep-throated, all-purpose overarm is provided with an upper chuck in the overarm assembly which makes it possible to chuck files, saws or lapping



Rice Model FS bench-type filing machine

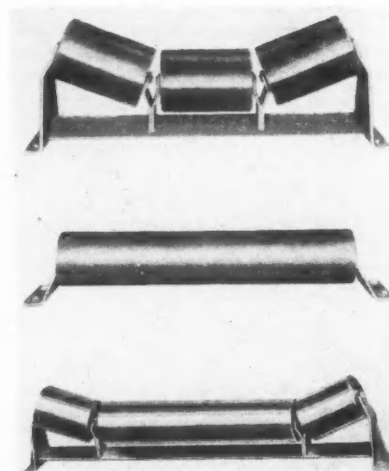
sticks at the upper, as well as the lower end. Spring tension on saws and thin files is adjusted by moving the overarm chuck assembly up or down. The new overarm furthermore permits chucking close to the work piece, assuring great rigidity of saws and files.

The lower chuck promotes precision workmanship. A ball joint permits perfect alignment of files with warped, crooked or twisted shanks before they are rigidly clamped in working position. Caps have serrated faces, with V-grooves, to firmly grip and align files, saws or stones of any size or shape.

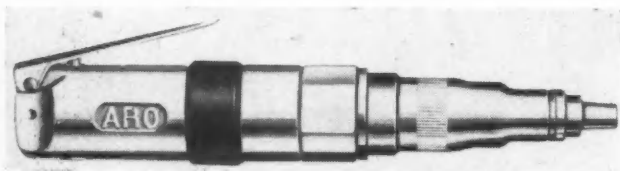
An adjustable stop assures immediate return to the original setting. The work table is mounted on two brackets and may be tilted 15 deg in four directions for accurate filing or sawing of compound angles. An adjustable hold-down finger holds work flat against the work table in any position.

(Turn to page 68, please)

M-81—New Type Belt Idler



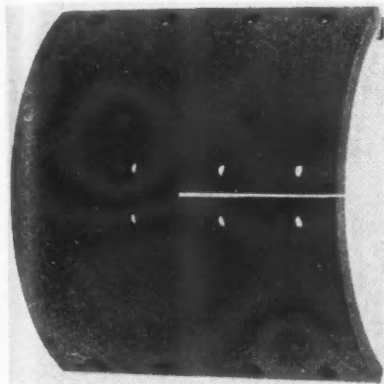
Palmer-Bee Co., Detroit, Mich., has just introduced a new type belt idler. The idler rolls are identical for each width of belt, removable by hand and completely interchangeable. Added, is the new feature of "Lubricated for Life" ball bearings, said to eliminate all greasing maintenance.



Aro low speed air screw driver and nut setter.

P-66—Two-Piece Brake Block

Recent innovation in the manufacture of brake linings by the Goodyear Tire & Rubber Co., Akron, Ohio, has resulted in a two-piece, heavy duty brake block for full coverage truck and bus linings, rather than the one-piece unit per brake shoe formerly offered. The new type construction is said to assure the same amount of density throughout the entire surface of the lining, with the distinct advantage of even, long wear. Illustration shows both the former one-piece,



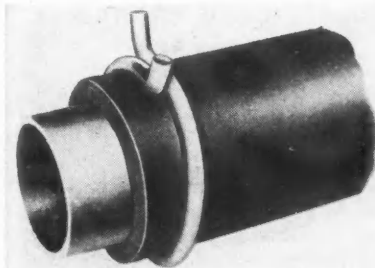
Goodyear heavy duty brake block

and the new two-piece construction. In the latter, the extremely small loss of braking area resulting from the open space is claimed to be far offset by the opportunity the shorter arc offers for molding a more efficient product.

The new lining is made in both Goodyear All-Weather compound (plain block), and Goodyear YKL (brass chip compound).

P-67—Self-tightening Hose Clamp

A new type hose clamp, applying the principle of sustained tension to a hose connection, is now being manufactured by the Corbin Screw Div., American Hardware Corp., New Britain, Conn. The clamp is recommended by the manufacturer for use wherever rubber of fabric hose must be connected to metal tubing to carry air, gases, or liquids, as in industrial and automotive applications. The clamp is self-tightening,



Hose Clamp offered by Corbin Screw Div., American Hardware Corp.



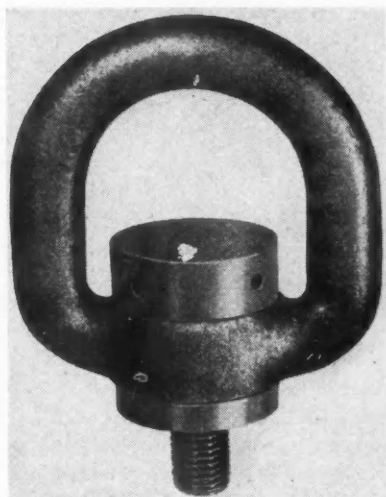
For additional information regarding any of these items, please use coupon on page 54.

due to its spring tension design, so that it maintains a correct sealing pressure at all times, adjusting itself to varying temperatures.

The clamp installs easily in hard-to-get-at places when the assembler squeezes the clamp open with pliers, slips it over the connection, and releases his grip. Its flexible seal does not require shellac or any other binding compound and it is claimed equally easy to disconnect, even with the seal unbroken for years.

The clamp is one piece, shaped from rounded stock to eliminate sharp edges, its diameter forming a true circle sized to grip the hose. Each clamp is made of cadmium-plated, heat-treated steel, available to fit hose of 7/16 in. to 2 5/8 in. O.D.

P-68—Self-Aligning Die Lifter



Self-aligning die lifter of the Modern Collet & Machine Co.

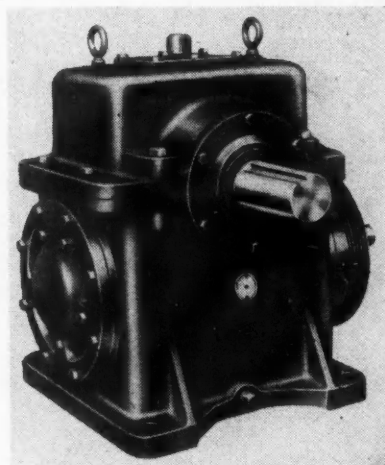
A line of self-aligning die lifters for safe and convenient handling of dies, machine tools and other heavy objects has been brought out by Modern Collet & Machine Co., Ecorse, Mich.

New units consist of a swiveling eye, which accommodates standard lifting hooks, and a stud assembly at the bottom, which turns as a unit for attach-

ing and removing the die lifter. The stud is quickly clamped at proper depth by turning the round nut inside the eye until the collar at the bottom seats against the object to be lifted. Since the eye swivels freely at all times, the stud cannot work loose.

The die lifters are available in four sizes, with maximum lifting capacities of 16, 28, 40 and 100 tons each. Studs are of 3/4 in., 1 in., 1 1/4 in., and 1 1/2 in. dia respectively and have U. S. Standard threads. All parts are of heat-treated alloy steel of over 180,000 psi tensile strength, and the swiveling eye lines up with the pull to eliminate twisting stress. Each die lifter is a permanent assembly, with no loose parts.

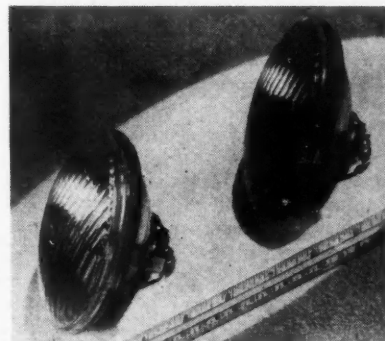
P-69—New Line of Worm Gear Drives



Foote Bros., Chicago, Ill., is introducing a new line of Hypower worm gear drives, both horizontal and vertical types, in a wide range of standard ratios in both single and double reductions. Units comply with speed-ratio standards adopted by the American Gear Mfrs. Assoc. (AGMA), and the National Electric Mfrs. Assoc. (NEMA).

P-70—All-Glass Reflector Fog Lamps

Hermetically sealed, all-glass aluminized reflector fog lamps for passenger cars and light trucks are available



Westinghouse No. 4015 and 4015A hermetically sealed all-glass aluminized reflector fog lamps.

from Westinghouse Electric Corp., Bloomfield, N. J.

The lamps, No. 4015 clear and 4015A amber, have a special cover lens that distributes the light in a rectangular beam 80-deg wide and 20-deg high. The hermetically sealed reflector of flashed aluminum has an exceptionally high reflection factor (93 percent) claimed not to deteriorate when the lamp is exposed to weather. It is said there is virtually no candle power depreciation throughout life.

Although the lamps provide a complete optical package which is renewed at the end of lamp life, they must be placed in a suitable lamp housing for practical use. Lamps are 35 watts, 6-8 volts, Par-36, 4½ in. maximum dia, screw terminal base, 300 hours rated average life, and 2¾ inches maximum overall length.

P-71—Balancing Hand Truck

The Tri-Truck, a new, mechanized, three-wheel hand truck announced by the Melooz Mfg. Co., Los Angeles,



Melooz three-wheel Tri-Truck

Calif., incorporates a telescoping support which adjusts and locks instantly to the correct balance position for any type and weight of load, even with the load on the truck. The truck itself balances and supports the load, so that inexperienced, older, or lighter men can do safe hand trucking work. The Tri-Truck provides leverage which more than doubles the trucker's strength, and is said to make wheeling the load almost effortless.

The Tri-Truck is claimed to keep the load balanced, even on rough, wet, or slippery surfaces, or if it strikes a floor obstruction, or if a collision occurs with another hand truck.

Once the Tri-Truck is loaded, it is set for use as an easel on the weighing platform, for movement in elevators, without the need for further loading and unloading.

The truck stands 56 in. high, equipped with ten inch diameter, rubber-tired roller bearing wheels, and free-swiveling ball-bearing hard rubber caster. It can be tilted and locked from fully vertical to fully horizontal.



For additional information regarding any of these items, please use coupon on page 54.

P-72—Mechanical Bond Tire Valve

Shortly to be furnished on premium tubes, a new tire valve which features mechanical bonding of the insert, as well as conventional adhesion, is now being manufactured by the L. K. Hosking Co., Monroe, N. Y. Valves for replacement needs are being sold through the Acme Air Appliance Co., Brooklyn, N. Y.

Unlike conventional valves which rely entirely on adhesion between the metal insert and base rubber, the insert of the Hosking valve is perforated, and

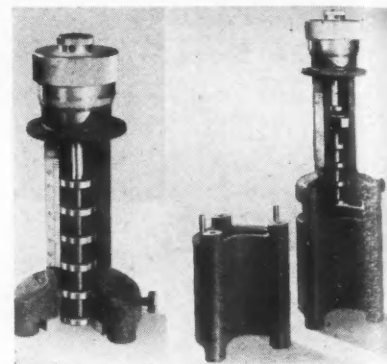


L. K. Hosking new tire valve

the base rubber is molded inside as well as outside the tube. During molding, the rubber flows through the perforations, securely bonding the valve in the base rubber. Tests are said to show that this mechanical bond alone, without conventional adhesive, withstands 100 lb air pressure without blowing the insert from the base.

P-73—Portable Tool Gage

A new portable 6 in. Pla-Chek gage designed primarily for the checking of smaller jobs is announced by Cadillac Gage Co., Detroit, Mich. It is said to



Cadillac 6 in. Pla-Chek gage

be ideal for the checking of gages, tools and dies either on the surface plate or at the machine.

Self-contained, the new gage can also be used on larger jobs without sacrifice of portability, its capacity increased by addition of six-inch risers which do not change overall accuracy. Claimed accuracy is to 0.00005 in.

P-74—Electrical Contact Metal

A new electrical contact metal having the desirable properties of fine silver plus a substantially higher "no-weld" current value is being marketed under the name Fasaloy 99, by Fansteel Metallurgical Corp., North Chicago, Ill. Laboratory tests show that the contact surface resistance of Fasaloy 99 is no higher than that of fine silver, even when the contacts are subjected to high temperatures of hydrogen sulphide atmospheres. Tests using ASTM specification B-182-46T also show that Fasaloy 99 contacts will make and break resistance load circuits of as high as 25 per cent more current than fine silver, without failure due to sticking or welding.

Fasaloy 99 is said to be particularly well suited where relatively low operating pressures and high temperatures are encountered, and where circuits of relatively high amperage are made and broken. The manufacturer recommends Fasaloy 99 for applications where silver contacts give trouble, and where refractory materials cannot be used because of their relatively low conductivity and necessity for higher contact pressures.

P-75—Carbide Tipped Die Chasers

Available for the first time for selected applications on turret lathes, automatics and threading machines are carbide tipped die chasers with ground thread forms, manufactured by the Jones & Lamson Machine Co., Springfield, Vt. Besides increasing threading speeds, they are claimed effective in steel, hard rubber, fiber and abrasive materials which ordinarily have a rapid dulling action on chasers.

LINK-BELT makes more and better sprockets
with **J&L JALCASE STEEL**

**J&L
STEEL**



**More parts per hour ... Better satisfied machine-tool operators
with this original, free-machining, open-hearth steel**

Link-Belt men like J&L Jalcas steel because it machines freely at high speeds, is easy to heat treat and the parts have a fine finish. They get more pieces per hour because Jalcas is uniform.

Their machinists particularly like Jalcas. They get higher production because of easier machinability, faster operation and extra long tool service.

Link-Belt is the world's largest manufacturer of conveyor and power transmission equipment—and

a large producer of sprockets and chains used throughout all industry. Jalcas, because of its unique combination of free-machining and heat-treating properties, helps Link-Belt overcome the ever-increasing cost of production. This means:

- Lower unit cost
- Finer finish on completed parts
- Higher physical properties
- Longer tool life
- Less down-time
- Less wear on machine tools

We should like to tell you more about JALCASE—the *original*, open hearth, free-machining steel. The coupon below is for your convenience.

Jones & Laughlin Steel Corporation
430 Jones & Laughlin Building
Pittsburgh 30, Pennsylvania

Please send me complete data
on JALCASE—the *original*, open
hearth, free-machining steel.

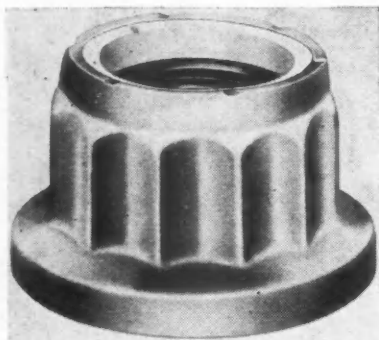
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Title _____
Address _____
City _____ State _____

JONES & LAUGHLIN STEEL CORPORATION

AUTOMOTIVE INDUSTRIES, October 1, 1948

U-5—High Tensile Hex Nut

Elastic Stop Nut Corp. of America, Union, N.J., announces immediate availability of a new high tensile, double hex nut, designed to develop 185,000 psi minimum in NAS high



Elastic Stop Nut, type EB

strength aircraft bolts where weight and space limitations are major factors.

Interchangeable with existing internal wrenching nuts, the double hex design permits weight reduction of 66 per cent, and height reduction of 50 per cent, offering aircraft engineers possibilities of further reductions in size of such airframe components as wing fitting forgings, engine mount brackets, and similar assemblies.

Features include nylon locking collar; steel body, cadmium plated; bearing surfaces square with axis of the threads within 1 deg for nuts up to and including $\frac{1}{2}$ in., and $\frac{1}{2}$ deg for nuts $\frac{9}{16}$ in. and larger; and self-locking ability in any position on the bolt or stud.

The new Type EB is available in sizes $\frac{1}{4}$ in. through $1\frac{1}{2}$ in. in National fine thread series.

U-6—Stable New Time Delay Units

The "Tarrytron," a new time delay unit with settings available from one second to two minutes duration, is now in production by the DiaPHlex Div. of Cook Electric Co., Chicago, Ill.

Carefully vibration-tested it is found stable when subjected to as high as 12 G's acceleration. Heater currents can be ranged from 6 volts to 115 volts, ac or dc. The unit is $2\frac{11}{16}$ in. long by $\frac{1}{4}$ in. in dia, with a total weight of only 3 ounces. It is furnished with an octal plug-in base, interchangeable with similar time delays, which gives Tarrytrons wide application in aircraft, scientific and industrial fields.

Supplied with relay contact arrangement in forms A, B, or C, each unit is hermetically sealed against moisture and atmospheric changes.

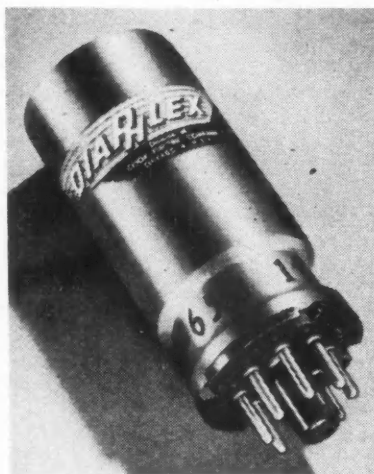
Timing tolerances maintained when subject to ambient temperature changes from -65 F to $+160$ F range from (1 second to 5 seconds at plus or minus 3

NEW

Products for

AIRCRAFT

For additional information regarding any of these items, please use coupon on page 54.



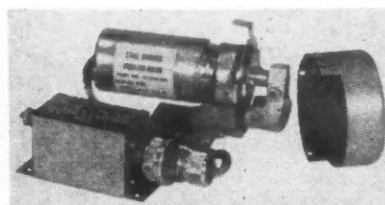
"Tarrytron" time delay unit

per cent) to (90 seconds to 120 seconds at plus or minus 10 per cent).

Where continuous duty and heavy currents are encountered, the "Tarrytron" is supplemented with a miniature relay so arranged that it is cut out of circuit as soon as it has performed its relay functions and the load currents are then carried on snap-acting relay contacts sufficiently heavy for severe service conditions.

U-7—Electric Vibrator

The Globe electric vibrator consists of a Globe Moto-Mite and gear unit to which is attached an unbalanced arm. The unit was designed originally for a stall warning system, in which it was mounted on the control stick of an airplane. Its use, however, can be extended to any application requiring a shaking



Globe electric vibrator

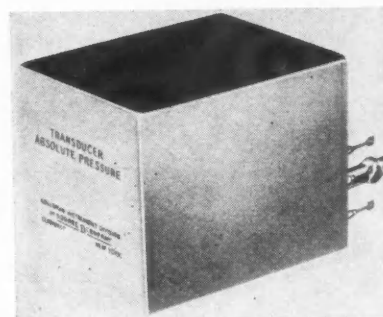
force of 6 lb. or less, at frequencies in the range of 30 C.P.S. The unit is furnished with a mounting bracket and with complete shielding and filter for radio noise suppression.

U-8—Telemeter Signal Device

The new Transducers, designed and developed by Square D Company's Kollsman Instrument Division, Elmhurst, N. Y., are said to answer the present quest for a highly accurate and precise electrical signal device for the telemetering system, which has become all-important in connection with flight testing and control application in pilotless aircraft.

Small in size and light in weight, the Kollsman Transducer is claimed to achieve the proper static balance imperative for reducing acceleration error to a minimum. No changes are noted when the Transducer is subjected to vibrations having frequencies between 8—30 cycles per second with amplitude of 0.0625 in. and between 100—130 cycles per second with amplitude of 0.005 in.

Designed specifically to limit mechanical friction to a minimum for accuracy and smooth repeatability, the Transducer is, moreover, temperature compensated, so that for temperatures



Square D Company's Transducer

from -20 to $+50$ C the error is less than 1.5 per cent.

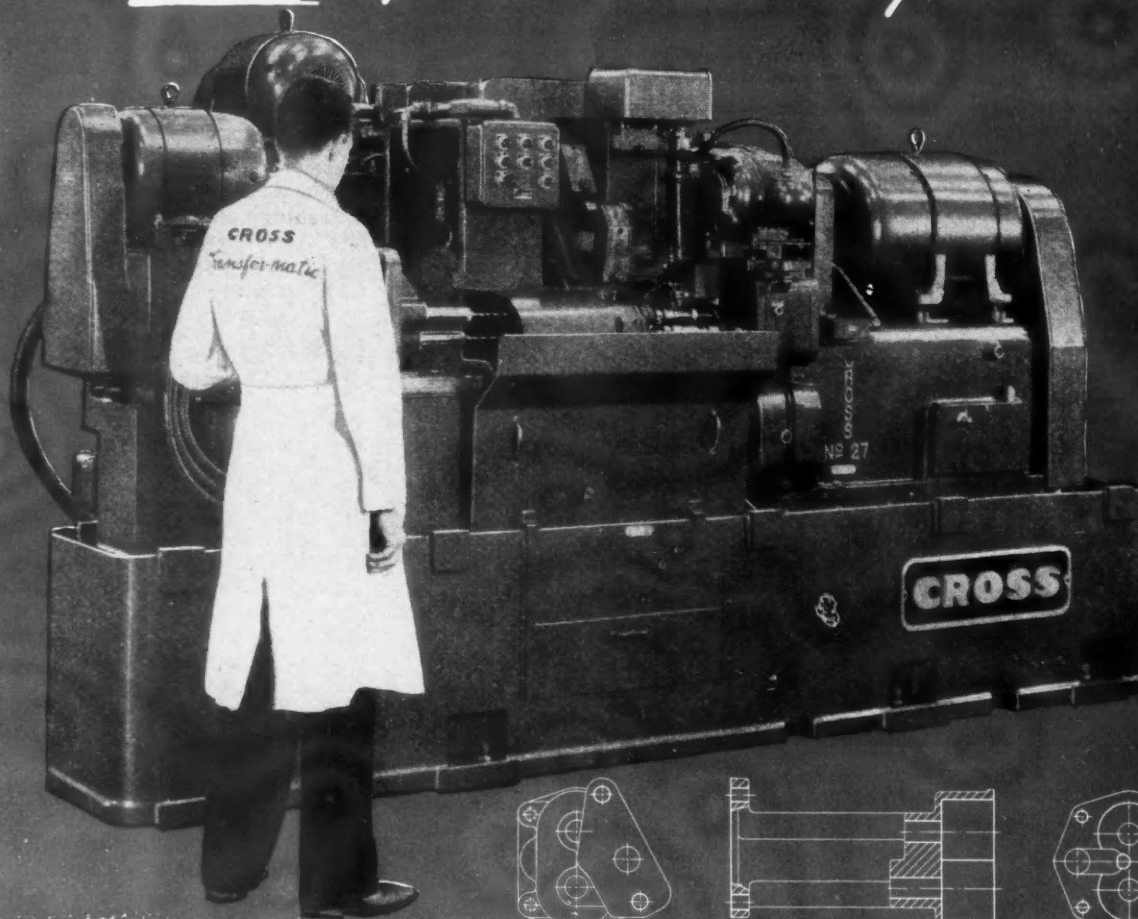
Two types of Transducers are available: the varying Resistor type which generally relies on DC source and which is $1\frac{1}{2}$ in. by $1\frac{1}{2}$ in. by 2 in. in size and weighs 6 ounces; and the Induction type which has application in AC system and is $1\frac{3}{8}$ in. by $1\frac{1}{8}$ in. by $2\frac{3}{16}$ in. in size and weighs 8 ounces.

The two types of Transducers are available in either the absolute or the differential pressure models which come in various ranges.

The resistor range of the varying resistor transducer is 0—2500 ohms, but may be adapted to other specific requirements. The linearity is 1.5 per cent and the resolution, 0.5 per cent of the total range.

The electrical signal of the induction type Transducer can be employed in conventional synchro circuits, variable voltage output, and phase shifter circuits.

Another Special Machine by Cross



Cross Method Cuts Both Initial Investment and Piece Costs

Because Cross has standardized on many units used in its special machine tools, it has reduced the initial cost of such equipment. This has made it economically possible to combine a variety of operations in one machine. As a result, manufacturing and handling costs per piece are drastically sliced.

For example, milling, drilling, boring, reaming, and tapping are united in the new and specially designed machine shown above, to process an oil pump body completely except for precision boring the gear pockets.

Perhaps *you*, like other manufacturers, can take advantage of standard Cross columns, way-type feed units, index tables, index trunnions, drilling, tapping, and milling spindles, and other component parts which can be combined in innumerable ways to solve your production problems.

PART: Oil Pump Body.

OPERATION: Mill both ends, drill two mounting holes L. H. end, drill and tap four cover holes R. H. end, drill and ream two bearing holes, rough and semi-finish two gear pockets, form pressure relief cavity.

PRODUCTION: 63 pieces per hour.

EQUIPMENT: Ten-Station Trunnion Type Machine.

FEATURES: ☆ Ten-station power operated index trunnion ☆ Nine pieces cut at a time progressively ☆ Independent station for loading and unloading while the machine is cutting ☆ Fluid drive index with overload protection for safety ☆ Automatic relief for milling cutters during return stroke ☆ Flexibility for part design changes through use of standard Cross index assemblies and way-type feed units ☆ Hardened and ground steel ways ☆ Hydraulic feed for drilling, reaming and milling ☆ Lead screw feed for tapping.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE CROSS COMPANY
Established 1898

SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of **AUTOMOTIVE INDUSTRIES**. In making requests please be sure to give the **NUMBER** of the item concerning the publication desired, your name and address, company connection and title.

L-88—Celeron Silent Gears

Continental-Diamond Fibre Co.—Celeron Silent Gears are described and illustrated in a new catalog, No. CG2. Information is given on the manufacturing process; standard forms and sizes; gear data; recommended practices for machining Celeron gears; horsepower rating and instructions for using tables presented on Gear tooth data; horsepower ratings, etc.

L-89—Wire Screens

The Cleveland Wire Cloth & Mfg. Co.—A new two-color folder complete with specifications on strainers and filters for industry is available. It describes and illustrates the various sizes, shapes and metals used in the manufacture of strainers and filters.

L-90—Cold Drawn Steels

Republic Steel Corp.—A new 28-page booklet describes cold finished steel bars. It includes information on typical uses and mechanical properties of the types

most frequently used, including machining grades of stainless, as well as data on commercial finishes, sizes and tolerances.

L-91—Hard Rubber and Plastics

American Hard Rubber Co.—A new 56-page handbook on hard rubber and plastics contains data on the physical and electrical properties of Ace hard rubber and plastics; tables of tolerances, weights and standard sizes of sheet, rods and tubes. Several pages on design techniques for molded parts, inserts, assemblies, etc., for hard rubber and plastics are included.

L-92—Hardfacing Alloys

Air Reduction Sales Co.—A 16-page, 2-color illustrated booklet, which also serves as a hardfacing catalog, describes each of Airco's new alloys in complete detail. Included are data on typical uses, specifications, application technique, deposit hardness, color markings and deposit analysis.

L-93—Metal Product Cleaning

The Alvey-Ferguson Co.—A new 28-page booklet gives information on the metal product cleaning problem. It is profusely illustrated and tells the factors to be considered in making a choice of equipment for thoroughly cleaning metal parts and products. A section is devoted to completely Co-Ordinated Conveyorized Systems engineered by the company to solve specific problems in leading industries. Flow charts show how Alvey-Ferguson cleaning and conveying equipment can be integrated into a line production system.

L-94—Wage and Hour Handbook

National Standard Parts Assoc.—Wages and Hours Under the Fair Labor Standards Act is the title of a new booklet that has been made available by the Association. The 16-page booklet was written and edited by Harold T. Halfpenny, the Association's legal counsel, and while it is not intended to provide the answer to every question that arises in connection with this act, it does furnish basic facts that are needed by wholesalers and manufacturers to be in compliance with the law.

L-95—Lubricator Valves

Titeflex, Inc.—The Grannan lubricator valve for single line centralized lubrication systems is fully illustrated

(Turn to page 100, please)

TIME SAVER COUPON for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

**Readers' Service Department,
Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.**

<p>Please send me: These FREE Publications (Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>	<p>Please send me more information on: New Production and Plant Equipment (Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>	<p>Please send me more information on: New Products (Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>
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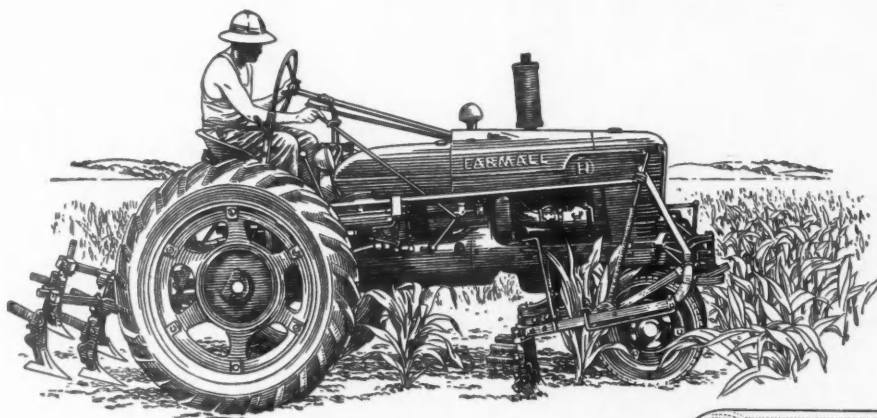
Your Name Your Title

Your Company Connection or Business

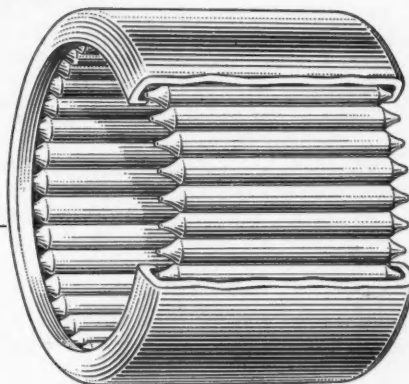
Address (Street & No.) (City) (Zone) (State)

Torrington Needle Bearings

Help Make it an Easier Row to Hoe...



Compact Torrington Needle Bearings are used not only in the hydraulic pump of International Harvester's Lift-All, but in the Farmall Model H tractor governor for smooth operation, efficient lubrication and long service life.



... new farm machines are easing and speeding many a task, aided by the efficient anti-friction performance of Torrington Needle Bearings.

Power of the tractor engine, transmitted smoothly through a Needle Bearing equipped hydraulic pump, goes to work in the Lift-All at a touch on a lever... raising and lowering cultivators, plows and other direct-connected implements... saving time and backache at the row's end.

In many other farm machines, high-capacity Torrington Needle Bearings play an important part in making the farmer's row easier to hoe, saving time and money by providing smoother anti-friction operation... reducing power consumption... lowering maintenance and lubrication needs... giving longer service life.

The compact, unit design of Needle Bearings also benefits the equipment manufacturer, by contributing to lightweight but rugged construction... saving time in fabrication and assembly.

These Torrington Needle Bearing advantages are important to you in equipment you use, build or sell... so consult our engineers, who will gladly help you adapt them to the requirements of your application.

THE TORRINGTON COMPANY
Torrington, Conn. • South Bend 21, Ind.
District Offices and Distributors in Principal Cities

TORRINGTON NEEDLE BEARINGS

NEEDLE • SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • BALL • NEEDLE ROLLERS

NEWS of the AUTOMOTIVE INDUSTRIES

(Continued from page 23)

U. S. Rubber Postwar Expansion Cost Over \$80 Million

Postwar expansion and modernization costing more than \$80 million has raised United States Rubber Co.'s production capacity to the highest peak in its history, it has been announced by Herbert E. Smith, president. Commenting on his company's progress, Mr. Smith said that \$30 million had been spent since the war on tire production facilities and \$50 million on non-tire products. "More than \$24 million has gone into the expansion and modernization of plants producing hose, belting, friction tape, wire and other special rubber products used by the oil, automobile, electrical, railroad, steel and other major industries; also footwear, raincoat, coated fabrics, foam mattresses and cushioning, golf balls, bathing caps, hot water bottles and many other items in the consumer field," he stated.

Name Anderson as Bliss Vice President

W. F. B. Anderson has joined the executive staff of E. W. Bliss Co. as executive vice-president and a member of the board. He was formerly executive vice-president and director of the Clearing Machine Corp. and prior to that he was general manager of Briggs Mfg. Co.'s plumbing division. He had also served with Maxwell Motors and Budd Mfg. Co.

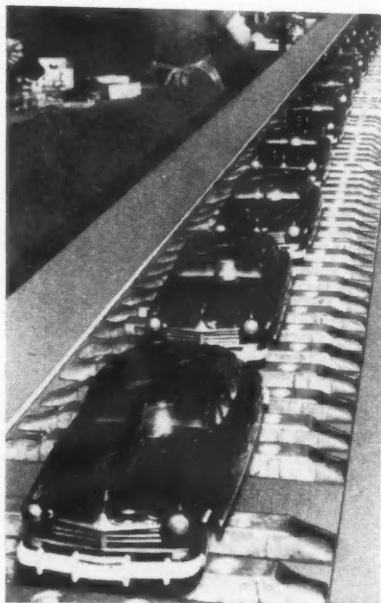
To Deliver Stinsons at Willow Run

The Consolidated Vultee Aircraft Corp. has completed arrangements for delivery facilities at the Willow Run Airport, Detroit, to serve Stinson dealers and their customers pending removal of manufacturing facilities to San Diego, Calif. Convair's Stinson Div. has built up an inventory of four-place Voyagers and Flying Station Wagons to satisfy dealer requirements for a period of several months in advance.

Automotive Services Form Cooperative Group

An organizing group comprised of special committees from Automotive Engine Rebuilders Association, Motor and Equipment Manufacturers Association, Motor and Equipment Wholesalers Association and National Standard Parts Association along with the executive managers of these organizations has unanimously chosen the name

"Automotive Service Industries, Inc.," for the name of the cooperative group which was recently formed to promote the best interests of wholesalers and manufacturers of parts, accessories, equipment, tools, chemicals, paints and supplies. Charles C. Tapscott, Advertising Manager of McQuay-Norris Manufacturing Co., St. Louis, was elected chairman, and William Myers of Myers Motor Supply of Joplin, Mo., was chosen vice-chairman. Chairman Tapscott stressed the fact that this was the first time in the history of this in-



MIDGET HUDSONS

These 13-in. scale models of the new Hudson four-door sedan are built to one-sixteenth scale and are said to be accurate to 0.0001 in. Developed for dealer use, the models are being produced on an assembly line.

dustry that such a large scale cooperative movement has taken so definite form, within the automotive service field, to promote the interests of all types of automotive service business.

William S. Jack Founds Aircraft Parts Firm

William S. Jack, founder of Jack & Heintz of Cleveland which gained national publicity for its unusual labor relations program during the war, is reported planning to start an aircraft parts plant near San Diego, Calif. Mr. Jack states that he has contracts lined up and is negotiating for a 40-acre factory site for his new plant.

SKF Allocates Capacity for Bearings for Aircraft

SKF Industries, Inc., has announced the allocation of productive capacity and the creation of special raw material reserves to meet the steadily rising anti-friction bearing requirements of aircraft engine and airframe manufacturers working on contracts for the armed forces. William L. Batt, SKF president, made the announcement in reporting "substantial" increases in new orders for aircraft bearings, particularly for jet engines.

UN Planning to Sponsor Int'l Traffic Pact

An international automotive treaty is a possibility for the first time, according to H. H. Kelly, of the U. S. State Department. He told the American Association of Motor Vehicle Administrators at their convention in Detroit that the United Nations is planning a special conference next year on a new international automotive traffic treaty. The agreement proposes to eliminate such problems as vehicle registration and driver's license previously faced by American motorists traveling abroad.

SAE Nominates for 1949

The SAE nominee for president for 1949 is S. W. Sparrow, vice-president, charge of engineering, Studebaker Corp., and for treasurer, B. B. Bachman, vice-president, charge of engineering, Autocar Co. Named for membership on the SAE Council for the term of 1949-50 were: G. E. Burks, chief engineer, Caterpillar Tractor Co.; N. H. Daniel, manager, Diesel Engine Div., General Motors Products of Canada, Ltd.; Earle A. Ryder, consulting engineer, Pratt & Whitney Aircraft.

The following were elected to serve on the SAE Council for 1948-49: F. W. Fink, chief engineer, Consolidated Vultee Aircraft Corp.; P. E. Hovgard, general manager, Piasecki Helicopter Corp.; Elbert E. Husted, president, Titeflex, Inc. Serving on the 1949 Council as past-presidents will be R. J. S. Pigott, chief engineer, Gulf Research and Development Co., and C. E. Frudden, consulting engineer, Tractor Div., Allis-Chalmers Mfg. Co.

Nominated for vice-presidents were: Air Transport: R. C. Loomis, director of flying, Consolidated Vultee Aircraft Corp.; Aircraft: Karl Arnstein, vice-

(Turn to page 58, please)

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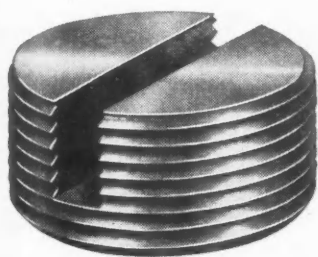
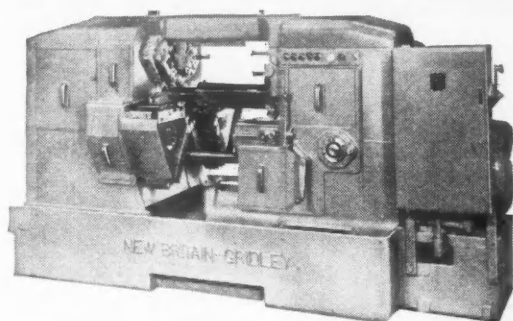
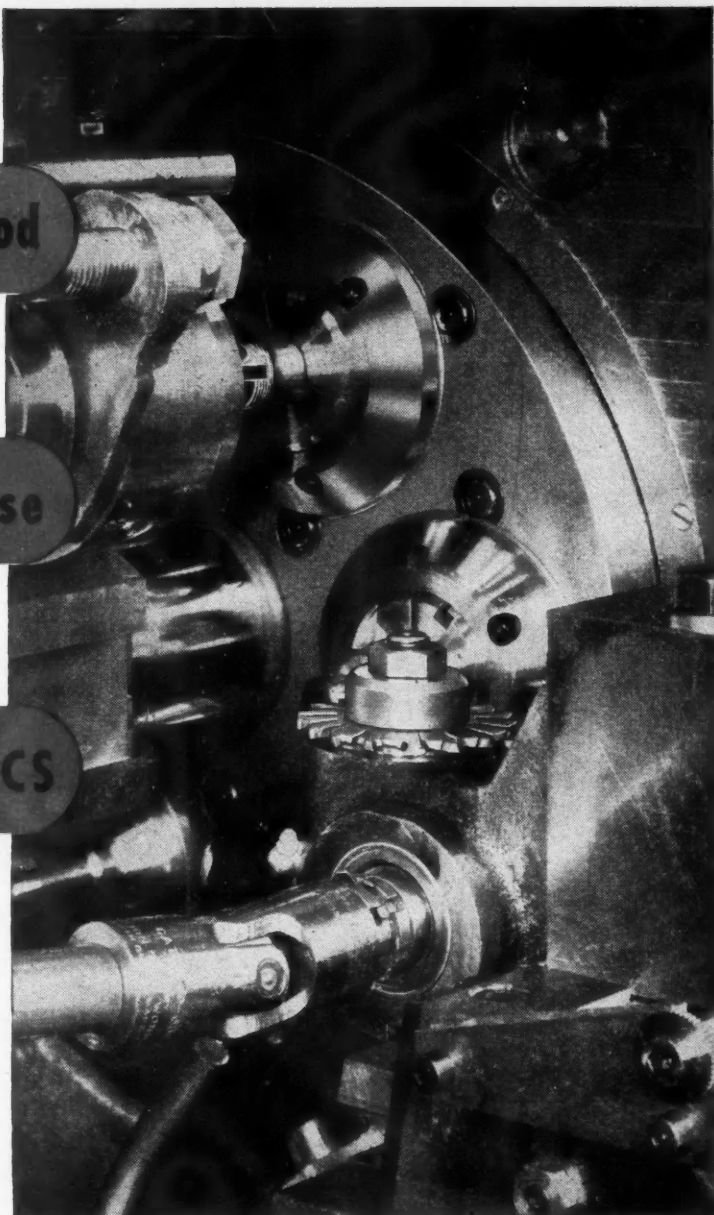
A Better Production Method

GAINED:

400% Production Increase

CREDIT:

NEW BRITAIN AUTOMATICS



Putting a $\frac{5}{16}$ " slot in this $\frac{31}{64}$ " thick plug formerly was a second milling machine operation in a leading automotive plant. The small gripping surface made handling slow and the piece costly.

The part is now turned out on one screw machine, a new Model 601 New Britain Automatic equipped with a slotting attachment in the fourth position. A completed piece comes off the machine every

131½ seconds—a sustained production rate of 265 an hour.

There are many reasons why a New Britain Automatic is the best possible investment a manufacturer can make. Here is an example of finding a new, better fabricating method. Often it is the adaptability of the machine to both long and short runs, or the fact that it will turn out a piece while a machine of old design is indexing.

Let us show you a number of specific "cost histories" that may point the way to higher productivity and reduced costs in connection with your work. Ask for the folder "It Can Be Done" . . . yours for the asking.

**MODERN AUTOMATICS
... THE WORLD'S SAFEST
INVESTMENT**



NEW BRITAIN
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

1048HHI

General News

(Continued from page 56)

president of engineering, Goodyear Aircraft Corp.; Aircraft Powerplant: W. J. Blanchard, general manager, GM's Aeroproducts Div.; Body: F. S. Spring, chief stylist, Hudson Motor Car Co.; Diesel Engine: M. M. Roensch, research coordinator, Ethyl Corp.; Engineering Materials: H. B. Knowlton, supervisor of materials engrg., International Harvester Co.; Fuels & Lubricants: H. L. Moir, technical adviser, Pure Oil Co.; Passenger Car: George B. Allen, staff

engineer, Chrysler Corp.; Production: L. C. Goad, vice-president, General Motors Corp.; Tractor & Farm Machinery: L. A. Gilmer, chief engineer, Oliver Corp.; Transportation & Maintenance: J. L. S. Snead, Jr., vice-president, Operations & Maintenance, Consolidated Freightways, Inc.; Truck & Bus: Ernest P. Lamb, chief engineer, truck div., Chrysler Corp.

British Jet Pilot Beats Speed of Sound

John Derry, an English test pilot, has flown an experimental De Havilland 108 research jet aircraft at over Mach 1,

the British Ministry of Supply recently revealed. Zooming in a dive, Mr. Derry reportedly passed the speed of sound at between 40,000 and 30,000 ft.

To Call Pratt & Whitney Jets, "Turbo-Wasps"

All propeller-turbine and turbo-jet aircraft engines produced by United Aircraft Corp.'s Pratt & Whitney Aircraft Div. will be called "Turbo-Wasps." While the name Turbo-Wasp will be applied to all turbine-type engines produced by Pratt & Whitney Aircraft, pure jet types and propeller-turbine types will be identified by the use of the letters "J" or "P," respectively, a type number and a letter designating the model. Thus, the company's first jet engine, on which production is now under way, will be called the Turbo-Wasp J-6B.

Gen'l. Tire's South African Plant to Produce in Jan.

The General Tire & Rubber Co. expects to begin production in its 80,000-sq-ft plant in Port Elizabeth, South Africa, about Jan. 1, 1949. It is anticipated that the plant will produce 75,000 units the first year: 50 per cent passenger and 50 per cent truck tires and tubes.

Name Rausch Vice President of General Electric

Raymond R. Rausch, former director of the Ford Motor Co., has been made vice president of General Electric Co. in charge of manufacturing policies. He has been associated with GE on the executive staff since last year. He started in the automobile industry in 1909 with Timken-Detroit Axle Co. and later went to the Lincoln Motor Co. and to the engineering division of Ford. He left Ford in October, 1945.

Old Timers to Cite Five for Distinguished Service

At the ninth annual meeting of the Automobile Old Timers, to be held in New York City on Nov. 9, the following, unanimously chosen by the Committee on Research and Awards, will receive Distinguished Service Citations: Charles F. Kettering, director and consultant, General Motors Corp.; Alvan Macauley, former president and chairman, Packard Motor Car Co., past president Automobile Manufacturers Association; H. O. Koller, automobile dealer continuously for over fifty years, Reading, Pa.; Leon J. Pinkson, automobile editor, *San Francisco Chronicle*; and Joseph Tracy, pioneer racing driver, designer and builder steam motor vehicles pre-1900.

(Turn to page 96, please)

If you manufacture...

You can save 3 WAYS with...
Essex "Packaged" Wiring Harness

1. ENGINEERING

2. FIRST COST

3. INSTALLATION

Scores of manufacturers have found that they save *time, trouble and money* by turning their electrical wiring harness problems over to Essex specialists.

Essex One-Source service handles the intricate job of producing lighting, ignition and control harness assemblies *custom-built* to your exact specifications and complete with all manual and electrical control devices for quick, efficient installation.

Through intensive specialization in wiring harness assemblies, Essex has developed line production methods of manufacturing, assembly and inspection, for the economical production of high grade, individually tested, specially engineered assemblies.

Investigate Essex "One-Source" service today!



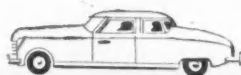
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WIRE ASSEMBLY AND CORD SET DIVISION
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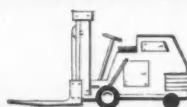
Automobiles



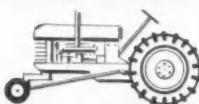
Trucks and Trailers



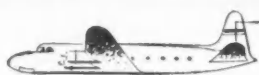
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Industrial progress and highway improvement are co-essentials in national development. American road builders have successfully kept pace with industrial progress by developing methods and equipment necessary in building better roads faster. Chicago Rawhide has had the privilege of serving many leading manufacturers of tractors and other road machinery by designing and producing for them a variety of Sirvis mechanical leather parts. These include several types of oil seals, cup leathers, diaphragms, protective boots and similar pliable parts. Let Sirvis serve you, too, in the solution of your mechanical sealing problems.

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OUR 70th YEAR OF INDUSTRIAL SERVICE

Trends in Aircraft Research

(Continued from page 37)

aerodynamic refinements that are presently impracticable.

One of our principal new problems is that of aerodynamic heating. Previously considered negligible, the heat problem has now become very important and, in some cases, has become a limiting design factor. The curve on Fig. 3 illustrates that the temperature rise of aircraft cabins and equip-

ment, in fact the temperature of an entire airplane, will increase approximately as shown with increasing speed. Thus, when operating at sea level at or above 500 mph on an average day it becomes necessary to refrigerate the airplane's cabin. At speeds of 800 mph and above, near sea level, it becomes necessary to refrigerate the airplane's hydraulic sys-

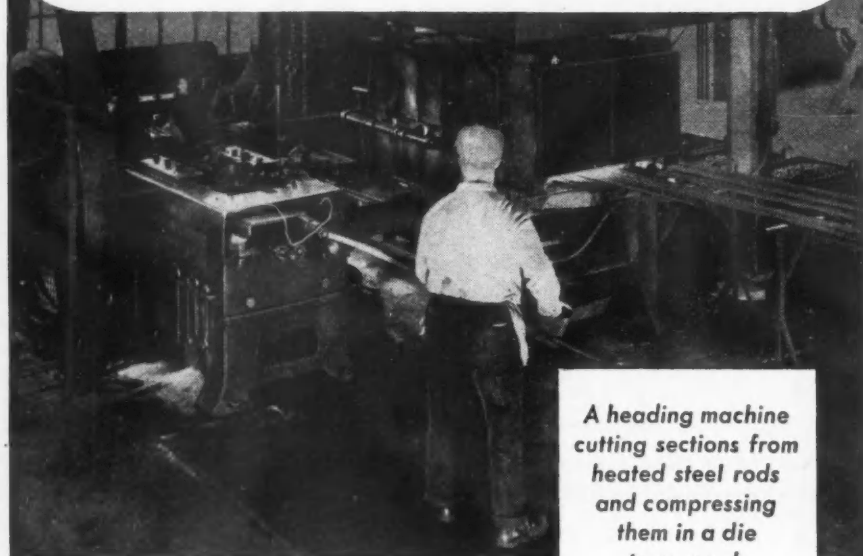
tem, radio and other equipment. Under such conditions and with present materials, the structural integrity of an airplane is reduced by approximately 10 per cent. A natural reduction in these high temperatures can be obtained by operating at an altitude of 35,000 ft as shown by the lower curve of this chart. Even at 35,000 ft cabin temperatures will exceed 100 F when traveling at 1000 mph.

Fig. 4 illustrates the effect these new developments and problems have had upon the trend of engineering manpower requirements. It is interesting that present day requirements are quite consistent with the trend before the war. This seems to indicate a normal growth for the demands upon engineering and research for the particular scientific and political age we are living in.

Perhaps the best method of conveying the magnitude of new research requirements is the trend in cost. Fig. 5 illustrates the trend of cost in developing a new experimental prototype. It may not be completely accurate, but it is based upon the best available information. While the future is unpredictable, a careful analysis of our past experience indicates that no great improvement in this trend can be expected in the near future in spite of all the economy measures, cross coordination, etc., that have recently taken place.

This is How

STROM BALLS are Born



A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

Strom BALLS  **Serve Industry**

Largest Independent and Exclusive Metal Ball Manufacturer

Austrian Porsche Glamorized Volkswagen

(Continued from page 44)

amounts to 1700 lb, of which 44 per cent is carried by the front wheels and 56 per cent by the rear wheels. The car is said to have remarkable road holding ability, this distribution of weight permitting it to take the steepest unimproved alpine road in second gear.

Total length of the Porsche car is 152 in. Its width is 66 in., front tread 49 in., rear tread 50.75 in., and wheelbase 83 in. Height of the coupe will be 50 in. Tire size is 5.00-16.

The Porsche is a robust vehicle for general use, having been designed according to the principles of the Auto Union rear engine racing cars. At the present time the Porsche Construction Co. has an order from a Swiss firm for 150 of them. The car has been wrongly called the Austrian Volkswagen, as it is far beyond the means of the average Austrian. It sells for 14,800 Swiss francs (\$3,700), but Dr. Porsche believes that mass production could reduce the price to about \$1,000. He plans to sell licenses for the manufacture of the car in foreign countries and already has had offers from Belgium and Switzerland.



Need a Triple Expander ?

Frankly, we don't believe anyone needs a triple expander. It's just an imaginary product designed to represent the many simple and intricate parts that C.W.C. *can* cast in volume production. Our forty years of casting experience, our highly mechanized production facilities, and our precision control of the casting process . . . are the required essentials to the successful manufacture of iron and steel castings, especially those of difficult or unusual specifications. The triple expander represents *your* part. Can it be *cast*? Can it be cast *economically*? C.W.C. has the answer!

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MUSKEGON, MICHIGAN: Henry Street Plant • Sanford Street Plant • Broadway Plant
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HOW FAST CAN YOU CHECK THIS FOR ROUGHNESS?

With the Profilometer, it's a matter of *seconds!*

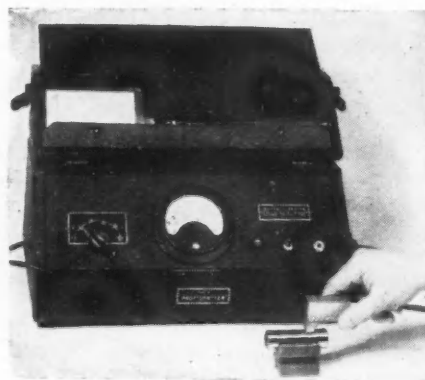
This instrument has a tracing speed of $1/3''$ or more per second—so a 10" piece like the one illustrated can be measured *from end to end*, externally or internally, in less than half a minute. Similar speed is provided in measuring surfaces from $1/32''$ up to *several feet* in length; and no technical knowledge or special skill is required.

Ease and speed of operation are two good reasons why hundreds of plants are using the Profilometer as standard shop equipment. Consistent accuracy is another: When the reading is taken, that's *it*. Any other operator will obtain the *same reading*, in definite *microinch units*.

And the Profilometer makes practical the advantages of *surface roughness control*. With this instrument, many plants are bringing their work more rapidly to final size and finish—often with fewer operations. They're shortening their set-up time. They're getting closer *dimensional control*—often detecting impending dimensional errors *before they occur*. In other ways too, they are making big savings in time and material—savings which quickly repay the investment in equipment.

Write for complete information on the Profilometer and its many applications—and arrange for a demonstration in your plant. You may be surprised to learn how this and other PRCo shop instruments can help lower your break-even point.

Profilometer is a registered trade name.



A SURFACE CONTROL INSTRUMENT BY

PHYSICISTS RESEARCH COMPANY

ANN ARBOR

MICHIGAN

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Narrow fluctuations in general business activity are indicated. The *New York Times* index for the week ended Sept. 4 stands at 147.4, as against 149.3 for the preceding week and 140.8 a year ago.

Sales of department stores during the week ended Sept. 4, as reported by the Federal Reserve Board, equaled 308 per cent of the 1935-39 average, as compared with 255 in the week before. Sales were 16 per cent above the corresponding distribution a year earlier, as against a preceding reduction of eight per cent. The total in 1948 so far reported is eight per cent greater than the comparable sum in 1947.

Electric power production declined less than seasonally in the week ended Sept. 4. The output was 15.9 per cent above the corresponding amount in 1947, as compared with a similar advance of 10.9 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 895,279 cars, 0.4 per cent more than the figure for the week before and 10.7 per cent above the corresponding number recorded in 1947.

Crude oil production in the week ended Sept. 4 averaged 5,531,450 bbl daily, a new peak, 2600 bbl more than the preceding average and 358,400 bbl above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended Sept. 4 is estimated at 11,900,000 net tons, 250,000 less than the output in the week before. The total production in 1948 so far reported is five per cent below the corresponding quantity in 1947.

Civil engineering construction volume reported for the week ended Sept. 9, according to *Engineering News-Record*, is \$106,894,000, or 27 per cent less than the preceding weekly figure and 39 per cent below the comparable sum in 1947. The total recorded for 37 weeks of this year is 25 per cent more than the corresponding amount in 1947. Private construction is five per cent above that a year ago, and public construction has increased by 51 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended Sept. 4 stands at 167.4 per cent of the 1926 average, as compared with 154.9 a year ago.

Member bank reserve balances increased \$93 million during the week ended Sept. 8. Underlying changes thus reflected include a decline of \$103 million in Reserve bank credit and a decrease of \$362 million in Treasury deposits with Federal Reserve banks, accompanied by an advance of \$215 million in money in circulation.

Total loans and investments of reporting member banks decreased \$37 million during the week ended Sept. 1. An advance of \$39 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, \$14,886 million, shows a net increase of \$2302 million in 12 months.

Spicer

Service-Engineered Axles

for
passenger car and
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SERVICE-ENGINEERED through 44 years of close working contact with every phase of America's automotive power transmission needs.

SERVICE-ENGINEERED to include these outstanding Spicer features: 1. Rigidity—an absolute essential for accuracy, and which holds gear deflections to a minimum, assuring quietness and long life. 2. Ruggedness—built to stand the high speeds and punishment of modern driving. 3. Accessibility—the cover can be removed easily for inspection of parts. 4. Oil Circulation—oil is circulated in the carrier to assure proper lubrication and cooling of moving parts.

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44 YEARS OF
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TORQUE CONVERTERS • UNIVERSAL JOINTS

CLUTCHES • PARISH FRAMES • STAMPINGS
SPICER "BROWN LIPE" GEAR BOXES • RAILWAY GENERATOR DRIVES

National Air Races

(Continued from page 40)

pupil, in the Wittman plane which won last year. The Wittman planes represent an entirely different approach to the problem by using steel tubing, fabric covered fuselage construction and wood and fabric covered wire-braced wings. Wingspan is only 15 ft, 4 in. and length is 17 ft. This construction does not permit the smooth surface nor faired contours of the all-metal LeVier designs, although it gains substantially

in lightness of weight. However, the Goodyear racer must weigh at least 500 lb to prevent weakness of construction so that much of the benefit of the Wittman technique, so successful in years gone by, is lost.

Art Chester, the only other racing pilot never to have missed participating in one of the 19 National Air Races, continued his series of "butterfly tail" designs with an additional air-

plane this year. The Chester designs perhaps incorporate more advanced engineering features than any of the others including fan-assisted cooling, jet-ejected exhaust and the unusual "V" tail arrangement popularized on the Beechcraft Bonanza commercial lightplane. Chester also uses welded steel tubing, fabric covered, for the fuselage and wood spar and rib fabric covered for the wing. A companion airplane, flown by Paul Penrose, features plywood-covered wing panels. This latter airplane was entered by Chester last year and took second prize money. Thoroughly professional design and construction is used in these two aircraft with great care given to external finish and clean aerodynamic design. This design could also have been produced commercially to meet existing standards of performance and appearance.

With few exceptions, the remainder of the entries displayed a sometimes amusing, sometimes tragic lack of aerodynamic finesse and technical competence. Many of them were "backyard" designs in every sense of the word. It should have been apparent to all entrants that with planes confined to the Continental 85-hp engine that the airplane with the lowest drag would be the fastest, yet such configurations as diamond-shaped fuselages, huge canopies, bulbous fuselage shapes, flattened wing tips and, above all, rough, irregular wing sections were much in evidence. In many cases little or no consideration was given to the stability or control of the airplane, owner-pilots relying solely on their usually expert piloting ability to overcome these stability difficulties. This was much in evidence on the straight legs of the quadrangular two-mile course when pitching and yawing were seen clearly from the press box high atop the grandstand.

Wing profiles, in most cases, were simply "thin" so-called "special racing" sections not otherwise described by their owners. Lift was available only from those portions of the wing lying inboard of the aileron region in most cases; with the tip areas consisting simply of flattened surfaces. All-metal construction was, however, in the majority, representing a growing trend over last year. Structural strength was available in all cases, due to the necessity for a competent stress analysis being submitted to the Professional Race Pilots Association, governing body of the event, prior to completion of the airplane. Single-strut flexible steel landing gears were the rule.

Power-plant layouts were uniform due to the laterally-opposed configuration of the Continental 85 engine, with

(Turn to page 66, please)

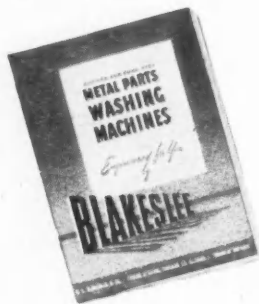


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REALLY
STICKS**

**WHEN METAL PARTS
ARE THOROUGHLY
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Write for FREE booklet on
Blakeslee Metal Parts
Washers to answer your par-
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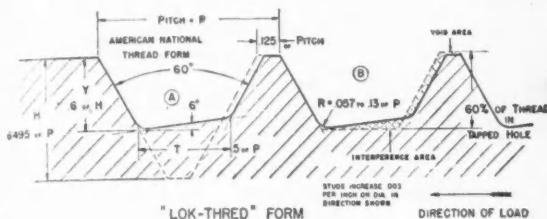
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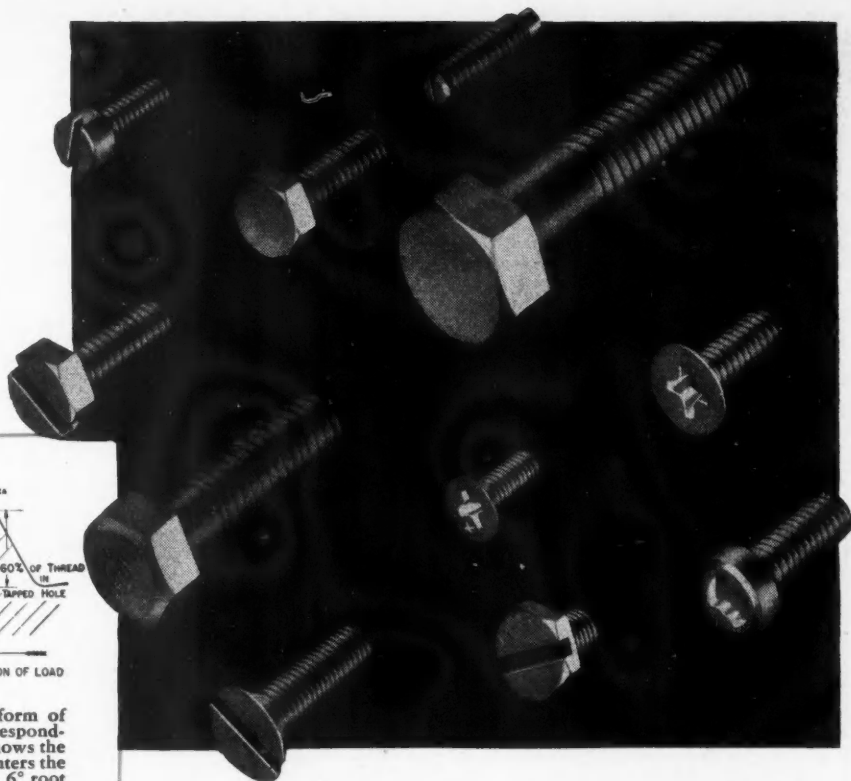
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METAL PARTS WASHERS

the only
thread that
OF ITSELF
holds tight



The heavy black line at position A shows the form of "Lok-Thred", while the dotted line shows the corresponding American National Thread form. Position B shows the action which occurs when the male "Lok-Thred" enters the 60° American National Thread tapped hole. The 6° root angle, through the interference created, causes a reforming of the socket thread, which fills the void area and causes a locking action, plus a positive seal.



IN "LOK-THRED", NATIONAL SCREW

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1. Lock securely and become tighter in service.
2. Have much higher fatigue limits than fasteners with conventional threads.
3. Stronger in both tension and torsion than ordinary American National Threads.
4. Carry entire normal working load on 6° angle at root of thread under high compressive prestress.
5. Modified American National Threads permit use of standard tools.
6. Re-usable and on any re-application less than one-half additional turn brings torque back to its original installation value.
7. Do not require selective fits.
8. Do not gall when being driven nor fret in service.
9. Act as dowels and taper pins.
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Write for "Lok-Thred" booklet, or send specific information on your fastening problem.



THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

air intakes disposed horizontally on either side of the fuselage. Many entrants ignored the necessity for providing a flow of this air out of the engine compartment and thus created back pressure that hampered and sometimes prevented adequate cooling. Carburetor air intakes were designed in a variety of flush and exposed inlets with poor aerodynamic characteristics. Considerable uniformity was seen, however, in the logical location of the wing along the thrust axis for two reasons: elimination of a pitching moment and confluence of the engine cowl and wing root fairing into a single excrescence, thereby eliminating the addi-

tional drag-producing juncture of the low-wing design.

The entry list, well over three times that of last year, is evidence of the popularity of the Goodyear event, which permits air racing for an average \$5000 investment and permits free exercise of individual opinion in exterior design. Next year should see as many more with the LeVier-Wittman-Chester leadership seriously threatened.

World's Speed Record Attempt

Greatest technical interest centered on the record performance of the North American F-86A swept-wing standard

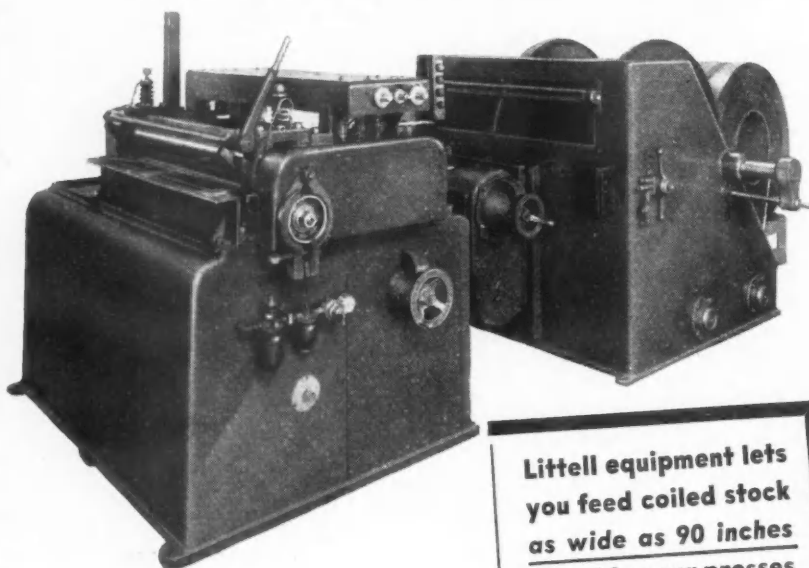
Air Force fighter, which far exceeded the existing world speed record but which did not receive official recognition due to malfunctioning of the recording equipment. The special three-kilometer (1.86 miles) course was prepared by the General Electric Co. through a \$15,000 allocation. The course cost only \$8000 to erect, the remainder going to the Air Service Pilot Relief Organization. The course was certified accurate to within 2¼ in. by the U. S. Coast and Geodetic Survey and high-speed cameras surveyed into position 800 ft in front of markers at each end of the course.

The rigid requirements for a speed record are seen in the fact that Major Richard L. Johnson, pilot of the F-86A, could not fly over the course at an altitude greater than 100 meters (328 ft), could not reach the second marker at an altitude lower than that at which he entered, could not fly higher than 500 meters (1641 ft) at any time during the flight and could not take longer than 30 minutes for the entire series of four runs over the course. Although these stringent regulations have brought complaints from jet pilots, they were created in the days of the Wright Brothers and proved adequate at the time.

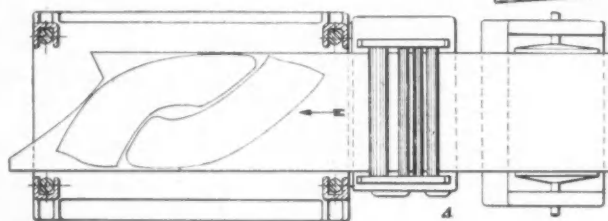
As Major Johnson made his first run over the course, directly in front of the grandstand, the camera at the east marker picked up a Navy FJ-1 fighter by mistake and the pass did not count. His second run, downwind, was timed at 685 mph, third run, upwind, at 662 mph, then 689 and 657, to produce an average speed of 669.480 mph, well over the 650.6 mph record held by the Navy's Douglas D-558-I Skystreak set Aug. 25, 1947. Informed by radio that his first pass had not been recorded, Johnson made an additional run at 675 mph. However, subsequent examination revealed that the cameras had not recorded three of the six runs, leaving Johnson one run short of the four required, and therefore, without a new official world speed record. Of major interest, however, is the fact that the swept-wing craft is capable of sonic speed in level flight and Johnson had gone aloft with the intention of breaking the record by only "about 20 mph" to prevent revealing the capability of the airplane. The F-86A has already attained supersonic speed in dives and repeatedly hit 700 mph in level flight at Muroc Air Force Base, Calif.

The swept-wing of the craft permits its attainment of sonic airspeed while the wing is undergoing subsonic pressure distribution, the key to its high performance. Another factor is its General Electric J-47 (TG-190) turbojet engine which is rated at 5000 lb thrust and is capable of developing 6000 lb with water injection. At top sonic speed this is the equivalent of 12,000 hp, an astonishing power output in single seat fighter with a wingspan of only 37 ft and a gross weight of only seven tons.

How to save in blanking and forming—



Littell equipment lets you feed coiled stock as wide as 90 inches direct to your presses



Left: see how fender blanks are nested for economy with Littell equipment.

GAIN tremendous savings. Use coiled stock in extra-wide sizes. With wide stock you nest irregular, awkwardly shaped blanks—reducing scrap losses. For example: auto makers save 12c to 15c per vehicle on stock alone, nesting fender blanks in this way. (See diagram.) Production rates per man-hour go up too.

Modernize your press room with Littell equipment. Littell has proved its leadership where it counts—out on the floor of actual factory press rooms. Today—write to Littell for complete details. REQUEST BULLETINS.

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Top: No. 6-38 Littell rack and pinion Feeding Machine, with No. C-100 Coil Cradle. Automatically straightens and feeds stock at desired feed length (0" to 74") and interval (7 to 28 lengths per minute). Run-in motor makes it easy to start new coils. Takes coils up to 1/16" x 36". Cradle capacity is 10,000 pounds.

Also available: Hydraulic-Drive Feeding and Straightening machines, taking coils up to 90" wide. Inch forward and reverse speeds (for easy threading of new coils) as well as automatic forward cycling from 30" to 160" feeding length. Cradles up to 90" and 30,000 lb.

One size of blade only for both types of E-Con-O-Mills of all diameters. Available for steel, for cast iron, and for non-ferrous materials.

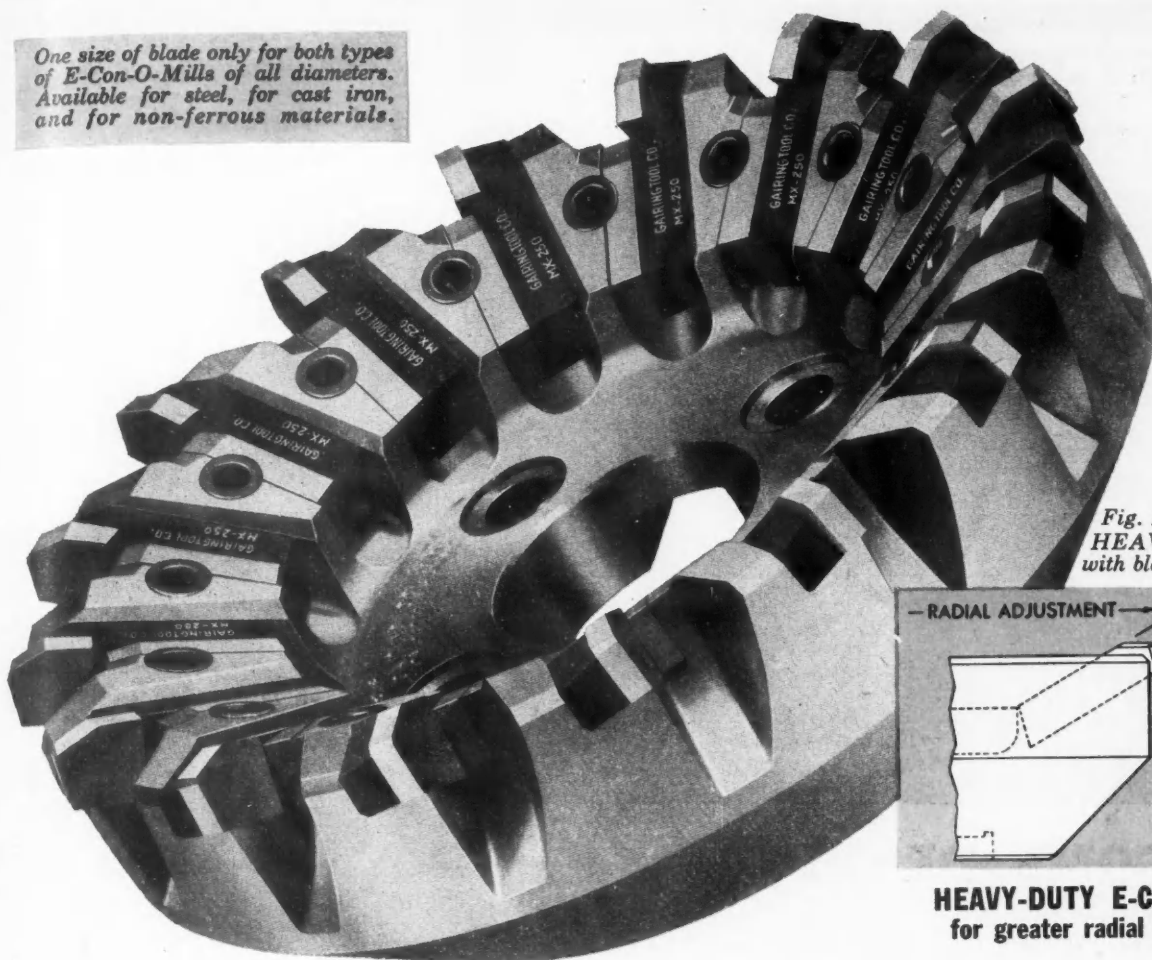
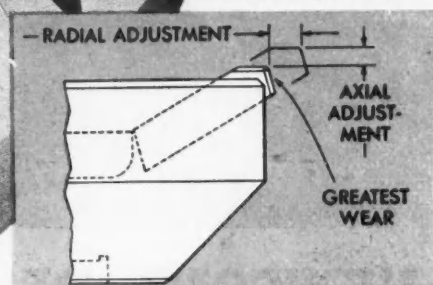


Fig. 1—10-inch **HEAVY-DUTY** with blades for cast iron



HEAVY-DUTY E-CON-O-MILL for greater radial adjustment

Now...the Gairing **HEAVY-DUTY** **E-CON-O-MILL**

PATENT APPLIED FOR

IN SIZES
8-IN. DIA
AND OVER

This new standard face mill is offered for heavy roughing operations where the blades suffer more wear along the periphery than across the face of the cutter. It offers all the economies of the regular E-CON-O-MILL plus longer blade life while roughing.

The same blades and locks are used in both the heavy-duty and the regular cone-type bodies of all sizes, a further reduction in tool inventory.

These are the same blades that come finish ground, ready for work, and which may be replaced and re-sharpened without removing the cutter from the spindle; the same locks which remain entirely attached to the body when changing blades.

For a heavy-duty face mill at its best, call your GAIRING representative or write to us.

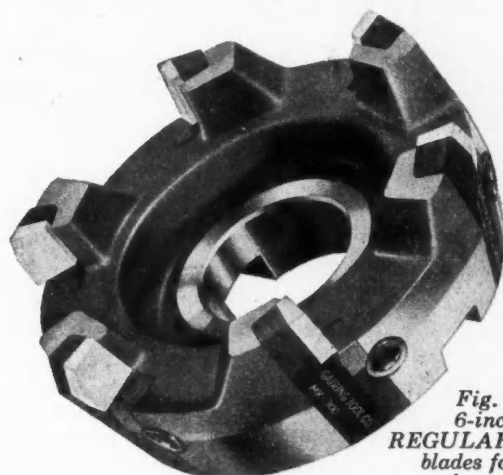
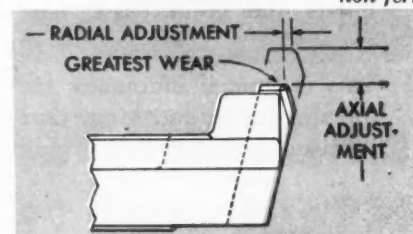


Fig. 2
6-inch
REGULAR,
blades for
non-ferrous



REGULAR E-CON-O-MILL for greater axial adjustment

THE GAIRING TOOL COMPANY

21221 HOOVER ROAD, DETROIT, MICHIGAN

DRYING TIME *Cut 50%*
FUEL COST *Cut 8%*



NEWCOMB-DETROIT Radiant Oven *Improves* Auto Finishes

Newcomb-Detroit engineered, built and installed this oven for one of the Detroit automobile manufacturers over two years ago. Burdette radiant-type burners were used throughout.

Drying time is cut from 45 minutes to 19 to 22 minutes on each of three coats while fuel costs are reduced 8%. But most important to the auto manufacturer was the fact that the finishes are harder, more durable in all types of weather and even the most delicate colors are held uniformly. In addition, these burners bring the oven to heat almost immediately which eliminates the 2-hour *warm-up* period formerly required.

The oven shown is one of several for auto bodies. However, Newcomb-Detroit also installed radiant gas ovens for fenders, hoods and other parts that make up the entire finishing system.

This is typical efficiency for Newcomb-Detroit installations for all types of finishing. Our engineers are at your disposal to discuss your finishing problems. Write today.

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1912



NEWCOMB-DETROIT

Engineered Systems—Standard Units

Spray Booths • Ovens • Metal Parts Washers • Fans
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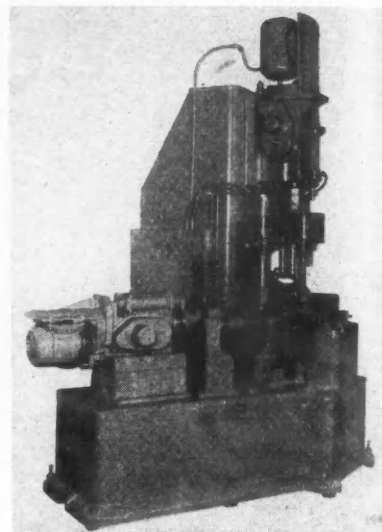
Western Sales
CHICAGO 5, ILL.

NEW EQUIPMENT

(Continued from page 48)

M-82—Automatic Index Machine

An automatic index machine recently produced by the W. K. Millholland Machinery Co., Indianapolis, Ind., for a large automotive manufacturer incorporates (in the vertical position), the newly redesigned No. 5 Millholland



Millholland automatic index machine

automatic unit, which has a 10 hp capacity and 6 in. stroke. The horizontal side head shown is the No. 4 size with 5 hp drive and 5 in. stroke. Other units may be added around the index table to perform additional operations as required.

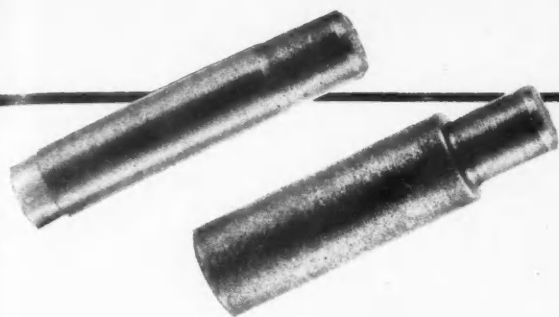
The automatic index table is independently motor driven and synchronized with the movement of the units by means of limit switches. The index table can be had in various sizes up to 42 in. with indexes up to 6000 or more per hr.

The machine is arranged for continuous or intermittent operation by push button control, and the operator is required only to load and unload the fixture. Two or more pieces can be loaded at a station where design or part permits.

The machine base and column are of welded steel construction, ribbed and normalized. The Millholland automatic units are mounted on sub-base with micrometer screw longitudinal adjustment. Vertical multiple head is counterweighted. Multiple heads are mounted on hardened steel guide bars and equipped with bushing plate arranged to register on the fixture at each index, although fixed bushing plates are used when the design permits.

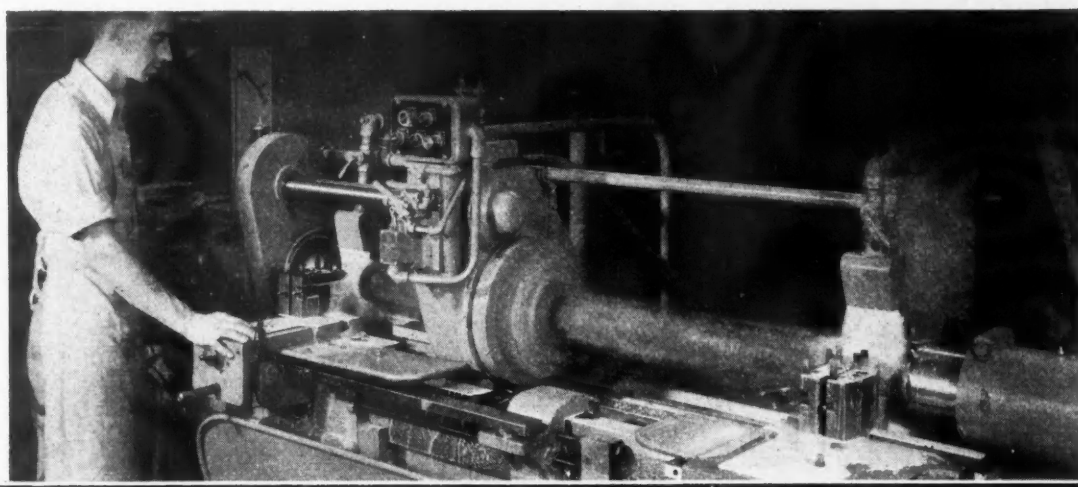
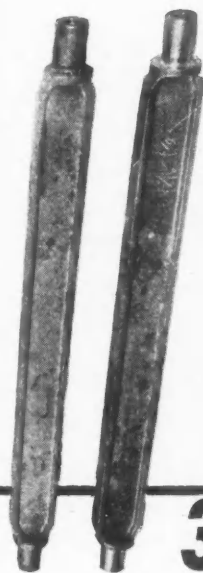
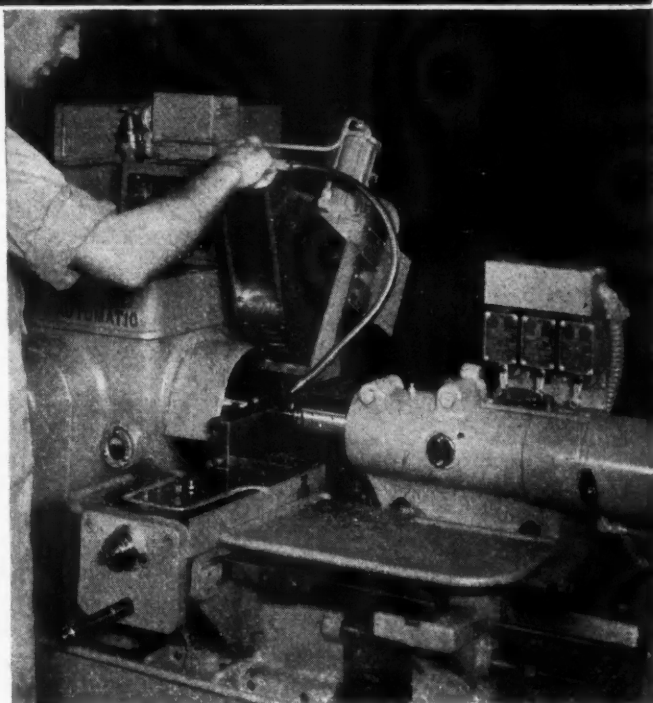
The machine is suitable for drilling, reaming, tapping, counterboring, chamfering or spotfacing operations, accurately and to depth. Production is given as 327 pieces per hr gross.

(Turn to page 72, please)



2 • LONG RUN TURNING

Here's an excellent example of high production turning and automatic handling of small parts. Two hundred cast iron valve guide bushings are turned per hour on this standard Model 8 Automatic Lathe with special hopper loading device. The operator's only duties are to keep the hopper filled. The bushings have two diameters turned, are automatically loaded between centers, automatically turned and automatically ejected.



3 • SPECIAL TURNING

Here's a standard Model 10 lathe with a special bed for handling work up to 66" long between centers. Two longitudinal feeding front carriages and two cross feeding rear tool slides are used with a center drive unit so that both ends of the part can be machined simultaneously. Both front and rear slides are adjustable so that, with some additional tooling, approximately 12 different sizes of parts can be accommodated. Production with this lathe and tooling has been increased on an average of five times over the former method. Operations consist of turn, shoulder and chamfer both ends of brake beams.



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MACHINE TOOL COMPANY**

2571 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES •

SPECIAL MILLING AND TURNING MACHINES

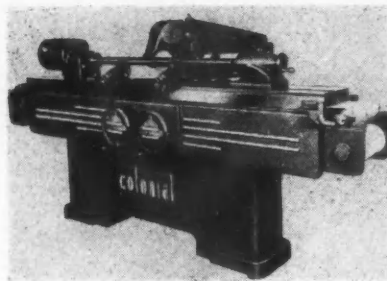
NEW EQUIPMENT

(Continued from page 68)

M-83—Complete Line of Broach Sharpeners

A complete line of broach sharpeners, comprising some seven basic models, has been placed on the market by Colonial Broach Co., Detroit, Mich.

The Colonial line includes two sizes of machines for sharpening flat broaches; three for sharpening "round" broaches; and two sizes of machines



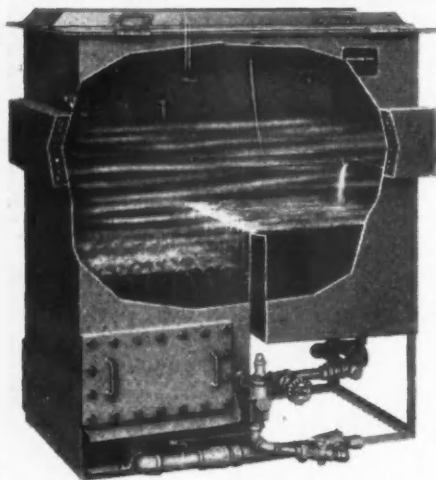
Broach sharpener of the Colonial Broach Co.

which handle both round and flat broaches. The flat broach sharpeners

handle broaches up to 8 in. wide and up to 32 in. and 65 in. long at one setting, respectively. The round broach sharpeners take broaches up to 6 in. in diameter and up to 3 in., 72 in. and 84 in. long respectively. They are designed to handle all types of "round" broaches—including spline, serration, and other types. The two "Universal" models handle round broaches having diameters up to 6 in. and up to 72 in. and 84 in. long, respectively, and flat broaches up to 8 in. wide and 65 in. and 77 in. long respectively.

All grinding wheels and headstocks on these sharpeners are equipped with built-in motors. Spindles of the grinding wheels on all machines have a standard speed of 4,000 rpm which can be increased to a maximum 10,000 rpm through use of special pulleys. Headstocks on the machines for sharpening round broaches—as well as on the "universal" models—have 2-speed gearing for spindle speeds of 200 and 400 rpm.

ANNOUNCING THE DETREX



"625" Two-Dip Hand-Operated DEGREASER With Quick-Conversion Heating

The Detrex "625" Degreaser provides for rapid, safe and thorough cleaning of small metal parts of all kinds in machine shops, production and maintenance departments. It can be heated by steam, gas or electricity, whichever is most practical at the particular time and location; and it is quickly converted from one type of heating to another where seasonal changes give added economy.

NOTE THESE FEATURES:

- **FAST!** Removes grease, oil and similar materials 5 to 10 times as fast as other methods.
- **EASY TO USE!** Simply lower the parts into the boiling solvent, transfer to cool rinse compartment and remove through vapor zone.
- **THOROUGH!** Leaves all surfaces, external and internal, clean and dry.
- **ECONOMICAL!** Built for long, trouble-free service life; has no moving parts. Quick change of heating method cuts operating cost.
- **SAFE!** The solvent used is non-flammable; cannot burn or explode.
- **COMPACT!** Model shown occupies less than 10 sq. ft.
- **AMPLE CAPACITY!** Handles 1000 lbs. of steel per hour. Immersion-cleans parts in space 18" x 21" x 12" deep; vapor-cleans parts up to 4 ft. long.

Write for Full Details and Specifications!

Degreasing Machines and Safety Solvents • Metal Parts Washers • Alkali and Emulsion Cleaners and Strippers • Processing Equipment • Spray Booth Compounds



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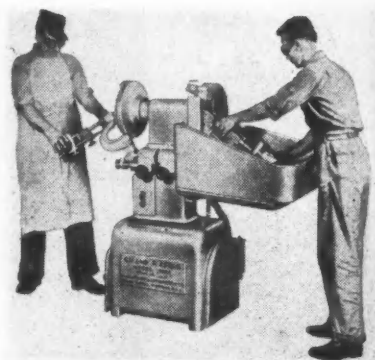
DETROIT 32, MICHIGAN

Corporation

M-84—Drill Grinding Machines

A complete line of new twist drill grinding machines for sharpening drills from No. 52 to 4 in. are made available by the Gallmeyer and Livingston Co., Grand Rapids, Mich.

The CWA double holder machine (illustrated) is designed to sharpen standard 2, 3, and 4 flute drills of either



Gallmeyer and Livingston drill grinding machine

straight shank or taper shank type at the standard 59 deg angle. This machine has capacity for sharpening twist drills from No. 52 to 2½ in. The small drills are ground dry on one side of the machine, the large drills wet on the opposite side.

The spindle of the machine runs in double row precision ball bearings capable of resisting heavy combined radial and thrust loads from any direction and in any combination. Bearings are grease-packed for life and have built-in shields for exclusion of grit.

A new diamond truing device for dressing the face of the grinding wheel makes it possible to automatically maintain proper relationship between the

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ST. LOUIS, MO.

holder and the face of the grinding wheel. It is not necessary to swing the holder out of position when dressing the wheel. As the diamond is fed into the wheel for dressing, the holder is automatically moved in to compensate for such amount as may be removed from the face of the grinding wheel by the diamond dresser.

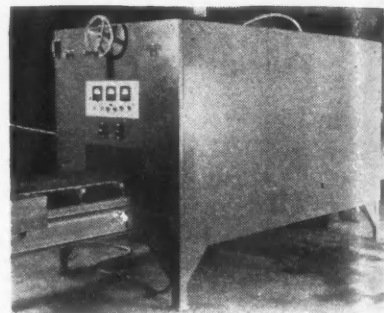
The coolant pump is driven by a V-belt from the same motor which drives the grinding wheel spindle. Coolant is delivered without force to avoid spray. All pump bearings are above the water-line and protected from grit and dirt.

The style CWA machine is equipped

with 12 in. dia grinding wheels and with 1½ hp ball bearing motor for spindle drive. With the V-belt drive it is possible to operate just the right spindle speed regardless as to whether the machine is operated on 25, 30, 50, or 60 cycle current.

M-85—Core Baking Tunnel

The new model M-800A Ther-Monic electronic core baking tunnel built by the Induction Heating Corp., Brooklyn, New York, having a capacity of 650 lb



Induction Heating Corp. is builder of this Model M-800A Ther-Monic electronic core baking tunnel

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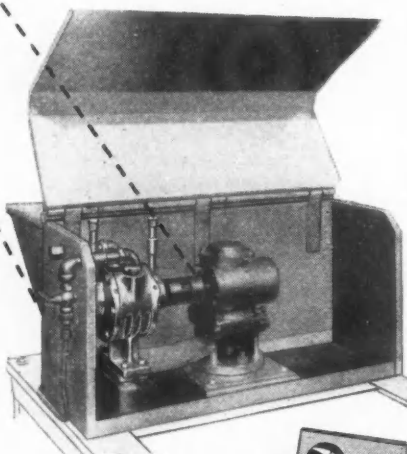
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Result: A top-notch combination for protective plastic-coating of precision parts and tools.

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ROTARY COMPRESSORS
VACUUM PUMPS

GAST MANUFACTURING CORP.
129 Hinkley Street, Benton Harbor, Michigan



of cores per hr, is said to afford an average baking cycle of only 20 seconds to a few minutes.

Green cores may be loaded, in the core-room, directly onto the Ther-Monic tunnel conveyor, eliminating all the racking and much of the handling of cores in the green state.

After the baking cycle the core plate emerging from the tunnel may go directly onto the inspection table. There is no cooling period involved and the cores are ready for immediate inspection and use.

The Ther-Monic method makes it possible to readily adjust and control the green strength, hot strength, hardness, collapsibility, and other characteristics of the cores. This ready control makes it easy to overcome the problems of hot tearing, burning in, and poor finish of the casting. Shake-out is so complete that core residue may be removed without mechanical assistance.

Ther-Monic electronic core baking, with resin binders, is claimed to have reduced gassing to the point where blow holes in the castings are no longer a problem. Nor is it claimed necessary to vent molds and cores to the extent previously required.

The Ther-Monic method is said to achieve a fine finish on the core surface, saving much labor in the finishing room. The very nature of electronic baking prevents over-baked cores and burned surfaces, which eliminates protrusion and pitting of the castings along with the subsequent chipping and cleaning operations.

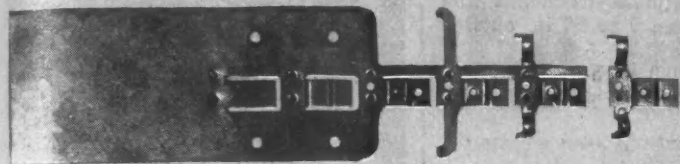
The Model M-800A core baking tunnel is a continuous conveyor type, self-contained unit 16 ft 9 in. long, 4 ft 4 in wide, and 6 ft 8 in. high.

M-86—Gas Power Fork Truck

Available for immediate delivery is a compact, gas-powered Tract-R-Lift fork truck, with 2000 lb capacity at 24 in. from heel of fork, manufactured by Tract-R-Lift Corp., Chicago, Ill.

Measuring only 28 in. wide by 61 in. long by 60 in. high and weighing 3050 lb, this new Tract-R-Lift has been designed for rapid materials handling in cramped quarters. Turning radius in-

**Averages
122,500 Pieces per grind**



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- ★ Long Island City 1, 47-28 37th St.
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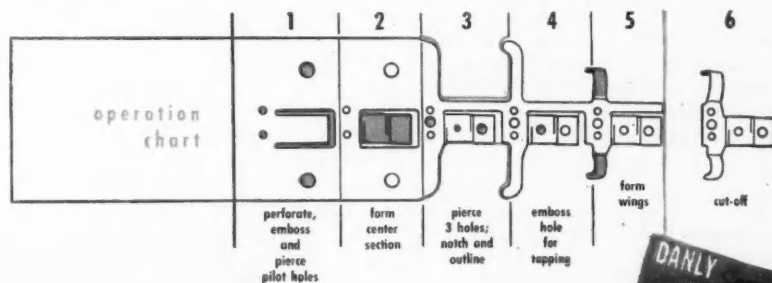
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The profitable application of progressive dies as a means to speed production and cut stamping costs is illustrated by this die setup. Operating costs are held to a minimum by the maintenance of close punch and die relationship. On a run of over 735 thousand mounting brackets, an average of 122,500 pieces has been obtained per grind. To assure accurate setups and precision operating results, a Danly 4-post precision steel die set is used.

Tolerance of $\pm .003''$ held on hole centers

The bracket is produced from $2\frac{1}{2}''$ by $.042''$ AISI-1008 steel strip at a rate of 7152 pieces per hour. A tolerance of $\pm .003''$ is held between the center lines of the two pierced holes and the one embossed hole. The hole sizes are held to $\pm .005''$.



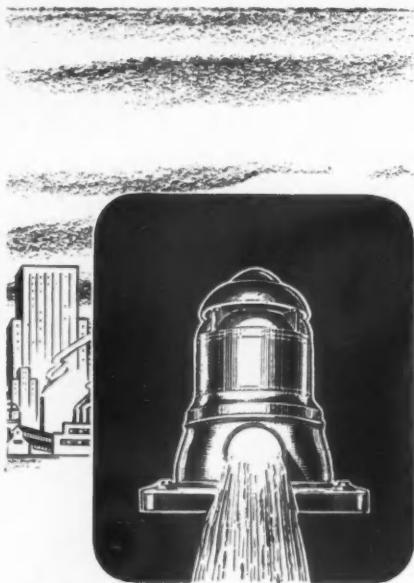
Write for this *free* bulletin

Illustrates how you can use Danly's machining service to save additional time and money on special die sets.



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"BETTER BUILT FOR BETTER SERVICE"

For nearly seventy years Layne Well Water Systems have been recognized as the world's finest, but now and then we like to remind our friends—and ourselves of the reasons why. From pump head to screen point, every single part of a Layne Well Water System is definitely "Better Built for Better Service." Maintaining that highly essential standard, especially during material shortages, has not always been an easy task, but not once has a compromise been made.

Today, Layne Well Water Systems are actually finer in quality of materials, higher in efficiency and better in construction than ever before. This is particularly pleasing to the entire Layne organization, for it affords genuine satisfaction to have users well pleased.

The advantages of owning a well water system in which full confidence may be placed is too obvious for comment. An unfailing and adequate supply of water is of utmost importance. It is a matter of record that the fine quality of Layne Well Water Systems is remembered and appreciated long after the purchase price has been forgotten.

For further information, catalogs, bulletins, etc., address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

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side is 6 in., outside 67 in. Single hydraulic lift-and-tilt control lever raises or lowers forks and tilts load forward or backward in any combination of simultaneous movements desired. Maximum fork height with 5-ft mast is 84 in.; with 7-ft mast, 108 in. Mast has 5 deg tilt forward and 10 deg tilt backward from vertical. Forks have automatic stop at maximum lift height, and are adjustable from 9 to 26 in. outside widths.

Speeds up to 10.9 mph forward and 8.9 mph in reverse are provided, with



Tract-R-Lift gas-powered fork truck.

low speed gears in both forward and reverse. Power is furnished by a 4-cylinder, water-cooled Waukesha ICK gasoline engine, capable of handling full loads up inclines as steep as 15 deg. Cool running is assured by a positive circulation water pump and large radiator.

M-87—Small-Head Shear

Called the "Grampus," a new, high-speed, low cost shear, designed with an unusually small head and base to permit wide variation in work shape, is announced by its national distributors, Federal Machinery Co., New York, N. Y. Material of almost any odd shape is said to be easily placed over the head or under the base for quick, efficient, burr-free cutting.

Fast inside cutting, both straight and contour, is afforded by means of a locking device. No starting hole is required for inside work. Rated up to and including 14 gauge mild steel, there is finger-tip control of the stroke, and rapid adjustment of the cutting blades



Federal small head high-speed shear.

for very light material. It will handle pipe work, pans, channels, tubes, shells, etc., of various diameters and depths, within the limits of its 7 in. throat.

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National Rubber Type—easy to insert, without springs or wires, yet can't fall out or shake loose. "A Pinch and It's In."

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For this same reason, it does not pay to play hunches in your selection of alloy steels. Carilloy steels have a record of exceptional performance under all kinds of unusual conditions. And Carilloy's handlers — the Carilloy metallurgical engineers — are recognized authorities in the field of alloy steels.

When these engineers size up the job you have to do, they bring with them years of experience in the highly specialized field of alloy steel application. And they play no favorites because they have a complete list of fine alloy steels to pick from—bearing steels, aircraft steels, gear steels, Nitralloy steels, high temperature steels and low temperature steels, regular and special analysis steels of every kind. In any form and in any size.

So if your job requires the unusual in strength, toughness, durability, stamina, fabricating qualities—get their expert opinion. They'll help you pick the alloy steel that's right for the job and that you can put your money on with confidence.

U-S-S Metallurgical Engineers and the outstanding research organization behind them have played a leading part in the development of the triple-alloy NE steels, and in the inception and introduction of hardenability bands, isothermal transformation studies, and new and improved heat treating methods. Through constant research and experiment these experts are continually expanding the usefulness and efficiency of special steels for the special jobs of industry.

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Carilloy Steels



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COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

UNITED STATES STEEL

Eleven Appraisal Guides for Automobile Loans

The board of governors of the Federal Reserve System has officially designated 11 automobile appraisal guides to be used in carrying out new Government restrictions on installment buying. The new restrictions, which are set forth in Regulation W, became effective on Sept. 20 and provide that the maximum loan value of any used automobile of 1938 to 1948 model inclusive shall be 66 2/3 per cent of the cash price or of the "appraisal guide value," whichever is the lower, and the

required down payment shall be the difference between the cash price and the maximum loan value. On a new car, a 1949 model used car or a used car of 1937 or earlier model the minimum down payment is one-third of the bonafide cash purchase price. The required down payment may be paid in the form of cash, trade-in, or both.

Regulation W requires that if the balance after the down payment is more than \$1000, 18 months will be allowed for payment. If the balance is

less than \$1000, only 15 months are allowed for payment.

The board of governors said that while a dealer is not required to use any particular automobile appraisal guide, he may use quotations from the current edition of any approved blue book designated for his particular territory.

The appraisal guide value to be used for purposes of Regulation W does not include any added value for cars equipped with a radio or heater, but it may include the added value specified in the appraisal guide for cars having an overdrive or automatic transmission as extra equipment.

The following appraisal guides have been designated by the board of governors for purposes of Regulation W (1938-1948 models, inclusive):

American Auto Appraisal, published by American Auto Appraisal, for use in Region A.

Blue Book—Executive Edition, published by National Used Car Market Report, Inc., for use in Regions A, B, and C.

Kelley Blue Book Official Guide, published by Kelley Blue Book, for use in Region C.

Market Analysis Report, published by Used Car Statistical Bureau, Inc., for use in Region A.

N.A.D.A. Official Used Car Guide, published by National Automobile Dealers Used Car Guide Co., for use in Regions A, B, and C.

Northwest Used Car Values, published by Northwest Publishing Co., for use in Idaho, Oregon, and Washington.

Official Automobile Guide, Price Edition, published by Recording and Statistical Corporation, effective October 1, 1948, for use in Regions A, B, and C.

Official Automobile Guide, Price Edition, published by National Used Car Dealers Association, Inc., effective October 1, 1948, for use in Regions A, B, and C.

Official Automobile Price Guide, Price Edition, published by The National Research Bureau, Inc., effective October 1, 1948, for use in Regions A, B, and C.

Official Wisconsin Automobile Valuation Guide, published by Wisconsin Automotive Trades Association, for use in Wisconsin.

Red Book National Used Car Market Report, published by National Used Car Market Report, Inc., for use in Regions A, B, and C.

The board of governors designates Regions A, B, and C as lying within these geographic areas:

Region A, the states east of the Mississippi River; Region B, the states between the Mississippi River and the Pacific Coast states; Region C, the Pacific Coast states, including Arizona, California, Idaho, Nevada, Oregon, Utah, and Washington.



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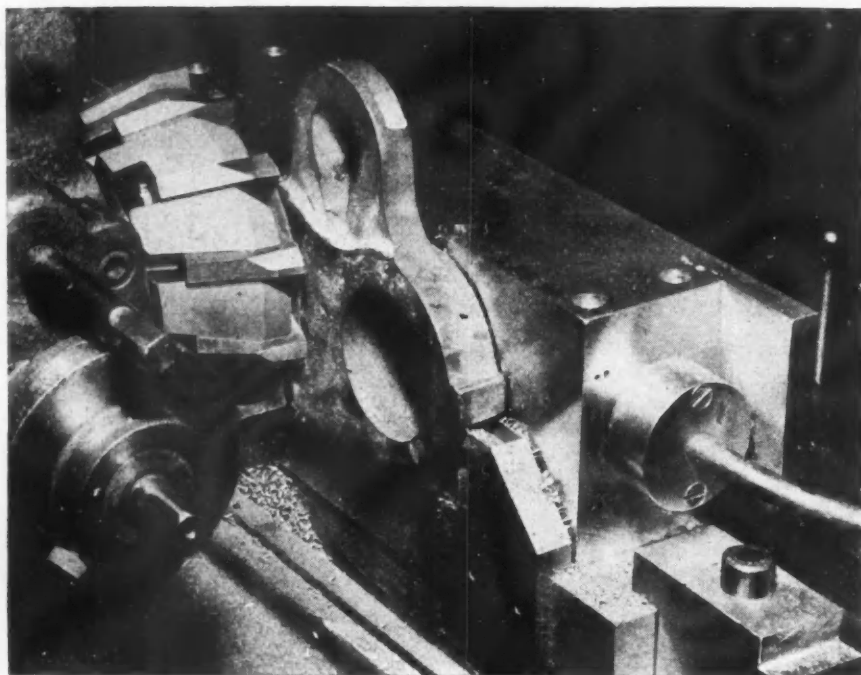
AUTOMOTIVE INDUSTRIES, October 1, 1948

Atoms Go to Work

(Continued from page 28)

Nearly all tracer research work starts with incorporating the radioisotopes into the chemical compounds which naturally take part in the processes being studied. Scientists in Commission laboratories have been developing methods of making tagged compounds ever since pile-produced isotopes became available, and the Commission is now preparing to produce for distribution in the United States a large variety of compounds tagged with

carbon 14. These will speed tracer research in hundreds of laboratories, where workers would find it expensive and often impossible to make such compounds for themselves. The Commission will continue to supply tagged compounds until this service is developed by private firms. Some of these are already in production. As rapidly as commercial sources are expanded, the Commission will be able to withdraw from the field.



Loading Time Reduced to an Instant Milling Castings with Power-Grip Holding

Illustration shows Power-Grip Chuck holding rough cast iron casting for milling. Cut is $\frac{1}{8}$ " deep, with 6" dia. Carbide tipped face milling cutter at 272 r.p.m., and feed at 16" per minute.

Power-Grip Chucks are an easy solution to many problems of holding castings. Simple, inexpensive adaptors can be made for castings of odd shapes and sizes. Work is set in accurate position, ready for milling, instantaneously. Reducing loading and unloading time to the extreme minimum means eliminating the major portion of the cost of most milling jobs, and with Power-Grip Chucks this can be realized quickly.

You can learn the possibilities for any job by sending us prints and operating data, so we can submit a complete proposal for Power-Grip Holding.

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CHUCKS

Stable Isotopes

Although stable isotopes are not literally manufactured by man, but rather separated from their brother atoms in natural elements, the history of their production closely parallels that of the radioactive isotopes. Attempts to separate stable isotopes began shortly after the naturally occurring radioisotopes were first observed; in fact, these attempts were greatly stimulated by evidence offered by radioactivity that such things as isotopes existed. Identification and production of both types of isotopes proceeded over a period of nearly 40 years until the wartime development of atomic energy made its great contribution to the production and the utilization of both.

In 1912, the same year in which radium-D was shown to be a kind of lead, work with newly developed vacuum tubes furnished strong evidence that there existed two varieties of the stable element neon. But for many years scientists failed in their efforts to separate them, since the only difference between the two kinds of neon lay in their weight and amounted to less than 10 per cent. In the meantime, however, the development of the instrument known as the mass spectrometer made it possible to observe isotopes, and by 1935 the important stable isotopes of all elements had been identified.

The first success obtained in the actual separation of stable isotopes—or more exactly the preparation of a sample of an element enriched in one of its isotopes—came in 1930 when "heavy water" (water containing hydrogen enriched in the rare hydrogen 2 isotope) was produced by distillation. Almost immediately this "tagged" water was put to use in biological and physical tracer experiments—as were the enriched samples of nitrogen, carbon, sulfur, oxygen, and chlorine also successfully prepared during the 1930s.

Electromagnetic Separation

But prewar techniques for the concentration and separation of stable isotopes were impracticable for most elements, and the largest samples of pure separated isotopes obtained were in the range of a millionth of a gram. The war revolutionized this situation. One major effort in the manufacture of the atomic bomb was an isotope separation project, for the extraction from naturally occurring uranium of the fissionable isotope uranium 235, which is only about one part in 140 of the natural element. At one of the three plants built to do this job—the electromagnetic separation plant at Oak Ridge—a few of the giant magnets not now needed for uranium separation have been put to work manufacturing stable isotopes for research, in quantities millions of times greater than were ever obtainable before.

As a result of two years of development
(Turn to page 85, please)

(Continued from page 82)

mental work by its contractors—the Tennessee Eastman Co. and later the Carbide and Carbon Chemicals Corp.—the Commission was able to announce late in 1947 the availability of over 100 electromagnetically separated stable isotopes of 29 elements. Also, stable isotopes of five other elements produced by other methods are available, three from Commission facilities and two from commercial firms.

Procurement Procedure

The prices charged for radioisotopes cover only direct production costs and not the cost of amortizing the investment in laboratory equipment and nuclear reactors, which have other important functions in the Commission's research and development program. Consequently, the present pricing policy results in a subsidy of the research in which radioisotopes are used. Furthermore, three radioisotopes—those of sodium, phosphorus, and iodine — are being distributed free for cancer research.

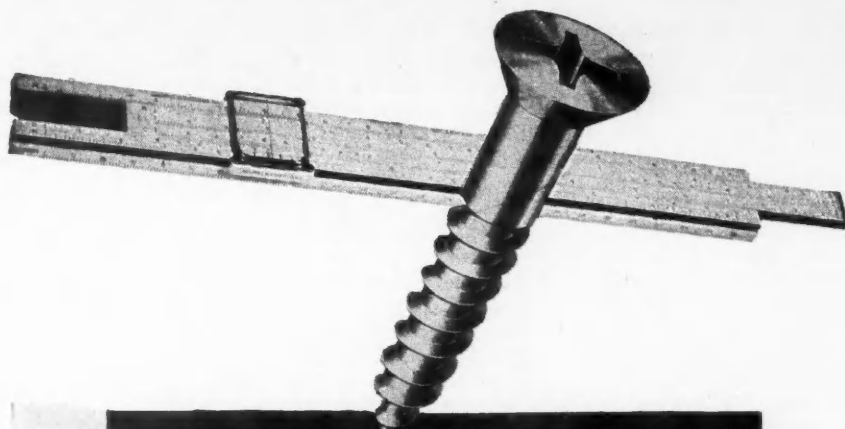
At present 100 kinds of available radioisotopes are listed and described in the AEC Catalogue and Price List issued by the Isotopes Division. New prospective purchasers submit an application describing the research they propose and their facilities for radiation measurement and health safety monitoring, and agree to publish the results of their investigations. Applications are reviewed by scientists in the Isotopes Division and if necessary by the Subcommittee on General Applications and by the Subcommittee on Human Applications when such use is contemplated. In the two years of the project's operation 1742 applications have been received and 1700 approved.

By the end of June 1948, 3136 shipments of pile-produced radioisotopes had been sent from Oak Ridge to users outside the Commission in 33 states of the United States, the District of Columbia, and Hawaii. The recipients were 236 institutions: 54 medical organizations and hospitals, 111 educational institutions, 53 industrial organizations, and 18 public and private non-profit research institutions. Within these institutions more than 385 different departments are using radioisotopes.

Foreign Distribution

In September 1947 the President announced the program of foreign distribution of isotopes by the Commission. Now, 29 radioisotopes of 20 elements important for general research, especially in biology and medicine, are available in limited quantities to foreign laboratories. The recipients agree to report semiannually to the Commission on results obtained and to publish their results; to use the isotopes only for purposes stated in the original re-

(Turn to page 86, please)



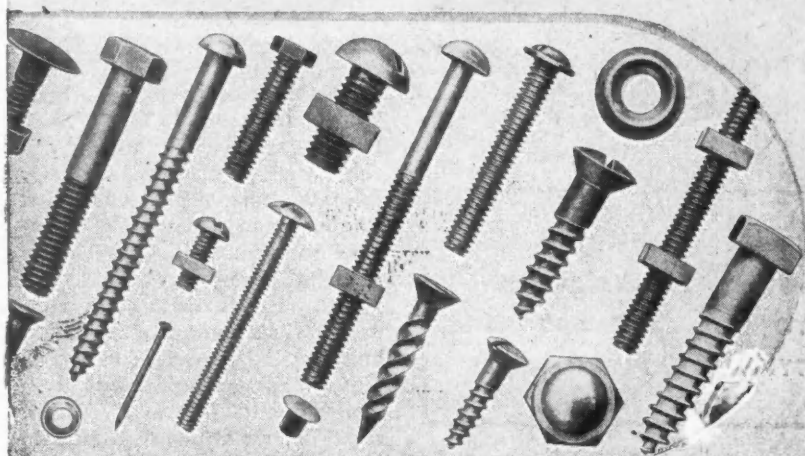
HOLTITE Engineered Fastenings

Reg. U.S. Pat. Off.

The completely scientific production of HOLTITE screws, bolts and allied fastenings is closely supervised through every operation by our skilled Engineering Staff. From the analysis of raw material to the final hardening, heat-treating and finishing every operation is meticulously checked and inspected by the latest scientific devices. Modern comparators throughout the production line supplement inspection devices to insure absolute precision.

Aided by special research in extensive chemical and metallurgical laboratories, our engineers are constantly improving methods, equipment and products to provide users with the most rugged, uniform and accurate fastenings science can devise.

HOLTITE Engineered Fastenings effect tighter, stronger, vibration-defying assemblies with cost-cutting efficiency. Select your next requirements from HOLTITE'S complete line . . . your time study records will prove the wisdom of their continued use.



CONTINENTAL SCREW CO.

New Bedford,
Mass., U.S.A.

quests; and to permit qualified scientists of all nations to visit their institutions and freely obtain information about the work. By the end of June 1948, 19 nations had qualified to receive radioisotopes: Argentina, Australia, Belgium, Canada, Cuba, Denmark, France, Ireland, Italy, Netherlands, New Zealand, Norway, Peru, Spain, Sweden, Switzerland, Turkey, Union of South Africa, and the United Kingdom; and 15 of these nations—all except Cuba, France, Ireland, and New Zealand—had already received 159 shipments.

Five stable isotopes can now be pro-

duced by physio-chemical methods and therefore are available in relatively liberal supply. Hydrogen 2 (deuterium), boron 10, and oxygen 18 are obtainable through the AEC Isotopes Division at Oak Ridge. By the end of June 1948, 325 shipments had been made to 107 institutions. Carbon 13 and nitrogen 15 are available from the Eastman Kodak Co., Rochester, N. Y. The Sun Oil Co. of Marcus Hook, Pa., has announced its intention of supplying carbon 13 and oxygen 18.

More than 100 varieties of stable isotopes of 29 elements that must be electromagnetically separated are also

available, but in limited quantities, from the AEC Isotopes Division. The first shipment left Oak Ridge on January 21, 1948 and between that day and the end of June, 37 shipments were sent to 12 institutions in the United States. At present, these isotopes are furnished to laboratories only on a loan basis, to be returned when the investigator has completed his research. In this way a "pool" of stable isotopes will be built up at Oak Ridge to supply the increasing demands of the future.

The uses of pile-produced radioisotopes which have been distributed from Oak Ridge are classified roughly into eight fields of investigation.

Field	No. of Projects June 1, 1946 to June 30, 1948
Medical Therapy	141
Animal Physiology (including human)	305
Plant Physiology	77
Bacteriology	26
Chemistry	171
Physics	193
Industrial Research	83
Metallurgy	14
Total	1,010

The safe handling of radioisotopes necessitates new laboratory designs and new work routines. Laboratories must be planned so as to avoid contamination of other areas; constructed with provisions for shielding, ventilation, and extreme cleanliness; and equipped with special implements for handling radioactive materials and with instruments for measuring contamination of equipment and exposure of workers. Laboratory personnel must develop new habits—for handling materials, surveying for contamination, changing of clothing, decontaminating equipment, and disposing of wastes. Safety, however, demands more than equipment and routine. Each operation and each experiment must be evaluated individually. Genuine understanding of the nature of radioactivity and its effects on living tissue is essential.

The AEC Isotopes Division maintains an Advisory Field Service to assist prospective radioisotope users, particularly in the avoidance of radiation hazards. Members of this group are trained in the application of isotope techniques to chemistry, biology, biochemistry, and engineering. The Division also distributes information circulars dealing with the problems of instrumentation, shielding, radiochemistry techniques, and general safety precautions. The National Committee on Radiation Protection has recently sponsored preparation of a valuable pamphlet on "Safe Handling of Radioisotopes."

Part II will be published in a forthcoming issue of **AUTOMOTIVE INDUSTRIES**.

GUNITE

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wheels...

for better trucking



**FRONT AND DUAL REAR
IN 20", 22", AND 24" SIZES
TO FIT MANY POPULAR
TYPES OF TRUCK AXLES**

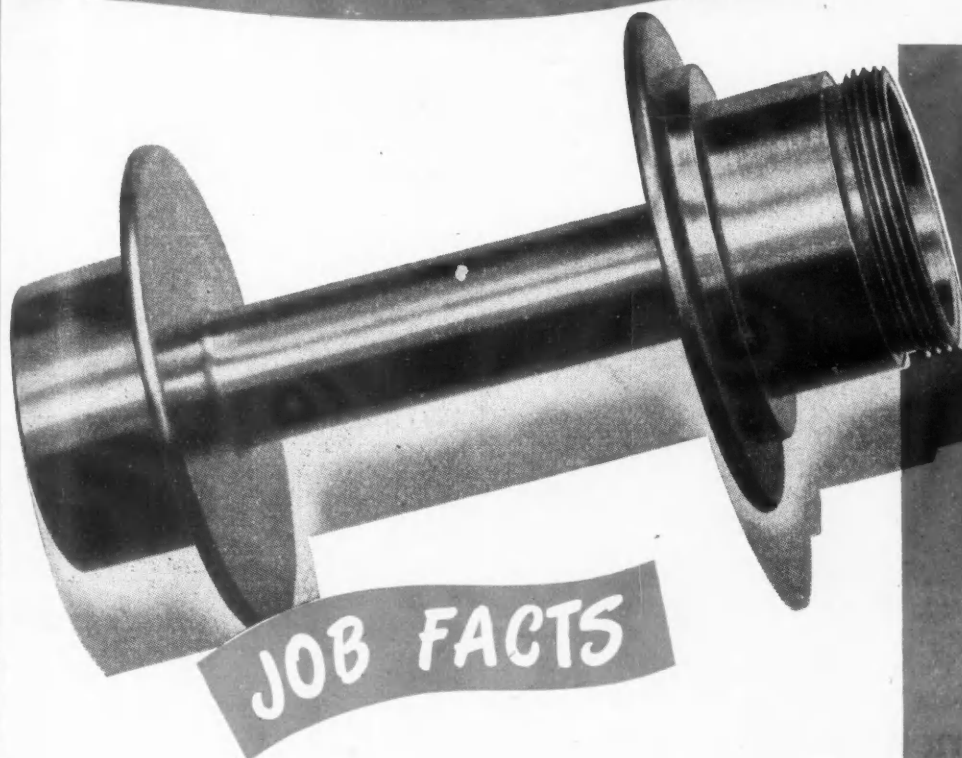
MADE BY
GUNITE FOUNDRIES
ROCKFORD, ILLINOIS

GUNITE Cast Wheels—both Truck Fronts and Truck Dual Rears—are made with many distinctive design features for greater strength, safety, and durability. These include deep-spoke structure that provides practically straight-line stress transfer from rim to outer bearing; extra-wide, non-slip lugs on floating rim bolts; and ventilated spacer (on rears). Gunites are made of strong, controlled-quality cast steel (except for 20" fronts, which are malleable iron). Accurate machining assures proper fit on standard axles. Famous Gunite Brake Drums are integral parts of these cast wheel assemblies. **Buy GUNITES—for better trucking!**

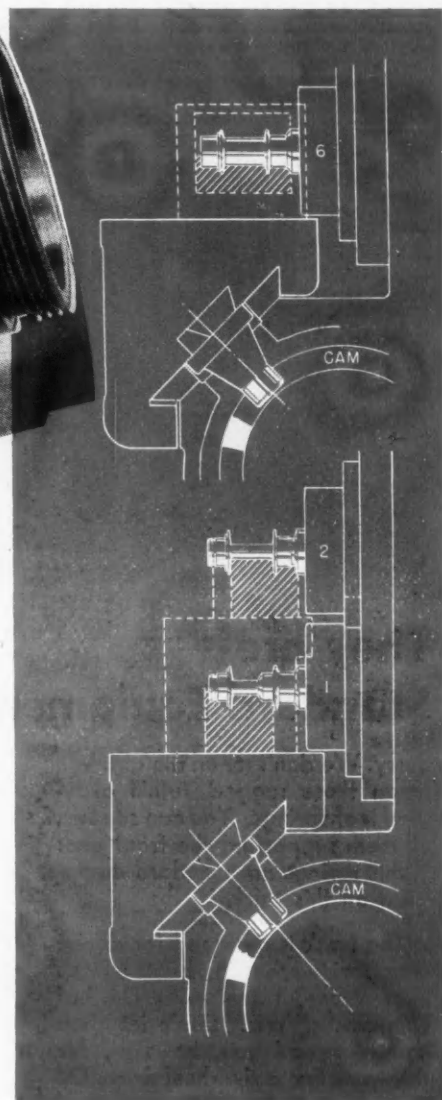
GUNITE WHEELS ARE CAST AND FINISHED IN GUNITE'S OWN FOUNDRIES AND MACHINE SHOPS

ACME-GRIDLEY

Positive *Quick Change* Camming



13 operations in 1 minute, 25 seconds, to machine this bicycle hub from 2" SAE 1112 bar stock on a 2 $\frac{5}{8}$ " RB Acme-Gridley 6 spindle bar machine. Wide forming cuts—of the kind that take machine stamina—are performed: three heavy forming cuts and shaving the front and back shoulders. Note tooling diagram at right, graphically showing the advantages of Acme-Gridley positive, direct close-coupled camming to the tool slides.



The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:
1-4-6 and 8 Spindle • Hydraulic Thread
Rolling Machines • Automatic Threading Dies
and Taps • The Chronolog-Limit, Motor Starter
and Control Station Switches • Solenoids
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Europe Renews Efforts to Develop Gas Generator Engines

In an effort to alleviate the shortage of gasoline in Europe, renewed action is being taken to develop the possibilities of using wood-gas as a fuel for automobile engines. Wood-gas for automobile fuel received its impetus in Germany and Austria between 1931 and 1933. In 1934 the Austrian Cura-

torium for Economy, in cooperation with Switzerland and Italy, organized the first International Alps Classification Race with substitute fuels, the outcome of which was that gas generators proved to be relatively satisfactory.

In the following years, until the beginning of World War II, France, Swe-

den, and Lithuania turned to this type of fuel and, following Germany's example, granted a reduction of taxes to users of gas generator vehicles. However, because of a certain feeling of mistrust among truck owners against this type of fuel, the change to wood gassification made very slow progress. In 1942 measures were instituted in Germany and her territories making conversion to substitute fuels mandatory. By the end of hostilities of World War II, more than 30 per cent of all trucks over three tons capacity and all buses had been converted to use wood gas.

There are still considerable deficiencies in generator gas drive. Efficiency is about 25 per cent below that of gasoline; if first class wood, preferably dry beech, is not used the efficiency may be 35 per cent less.

A recent Generator Conference held in Berlin for the purpose of stimulating the effort for the improvement of wood generated gas driven vehicles, brought forth some possibilities that apparently had not been considered in the past. New engines of the same speed as their antecedents should have the capacity of their cylinders enlarged by about 50 per cent in order to better accommodate the low mixture-heating power, the partial vacuum in the generator, and the burning conditions of the fuel. The number of cylinders in an engine should be reduced so that a former six-cylinder, 60 hp engine should have only four cylinders. With the aforementioned greater capacity cylinders, larger valves could be used. Overhead valves are recommended. The speed of this engine should be less than that of a corresponding gasoline engine in order to reduce the efficiency loss resulting from the slow burning velocity of the generated gas. In order to avoid heating of the intake manifold, it should be placed on the opposite side of the engine, from the exhaust manifold. Because of the increased ignition voltage at a compression ratio of 8 or 9 to 1, a highly effective ignition coil is required. The gas producer should be so located that a very short pipe connects it with the engine.

Since really serviceable wood for generating fuel in many countries is not available to the extent necessary, brown coal bricketts are to be preferred. Brown coal bricketts may be procured almost everywhere very easily; they have a higher fuel value than wood and no other fuel can offer the same cheapness per driving mile.

A further recommendation is the construction of a turbo-steam drive coupled to a generator-gas unit. This development has nothing to do with the hitherto steam drives. Preparatory works in this field have already been done and it is only necessary to submit them to exhaustive tests.



They are Standard Equipment with this truck

Sorry. We don't mean the girl. We mean those rugged Tuthill alloy-steel leaf springs. You can see two of them supporting the front end. Tuthill springs are standard equipment on this truck.

The truck is designed for desert transport work. It is built by the Four Wheel Drive Auto Co., of Clintonville, Wis. Don't let their name mislead you, however, for this truck has a six-wheel drive. Oil men use it to haul heavy oil field equipment in the Near East.

The springs are typical of the powerful Tuthill leaf springs which are used throughout the automotive industry. But whether you

have need of heavy-duty springs like these, or of light-weight springs—Tuthill provides you the ideal model for your purpose.

Tuthill springs serve you better, because they are designed better. They are carefully engineered of selected alloy steel. They are heat treated under pyrometer control. They stand up under a lifetime of road shocks without metal fatigue.

Right now—while you are thinking of it—make a note to contact Tuthill about your own springing problems. Tuthill's engineering department will be glad to assist you, and at no obligation to you, of course. Write for information.

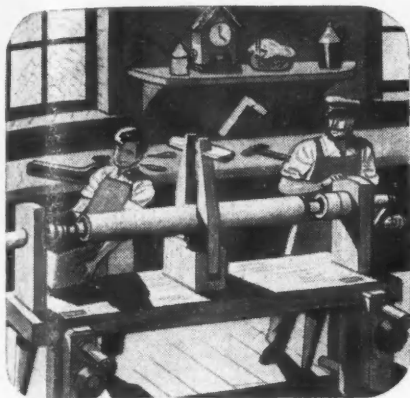


TUTHILL SPRING COMPANY

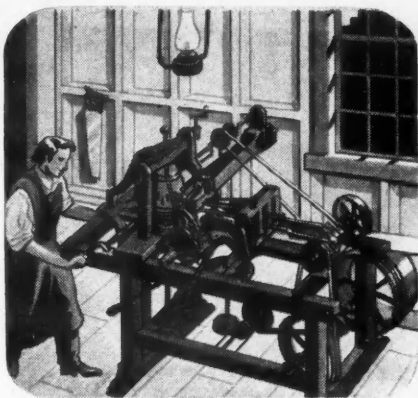
760 W. Polk St., Chicago 7, Ill.



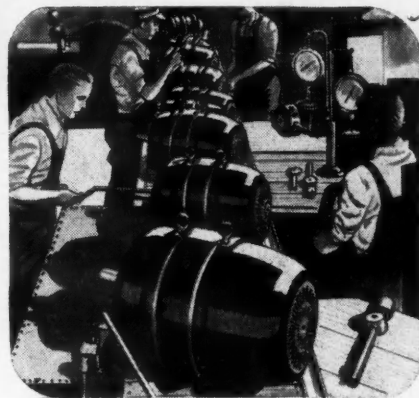
Quality Leaf Springs for Sixty-eight Years



1 1827—Early machine tools were a result of shop owner and mechanic tinkering around, trying to step up output. They were hand built, crude, and no two machines were alike, since measurements were not yet standardized.

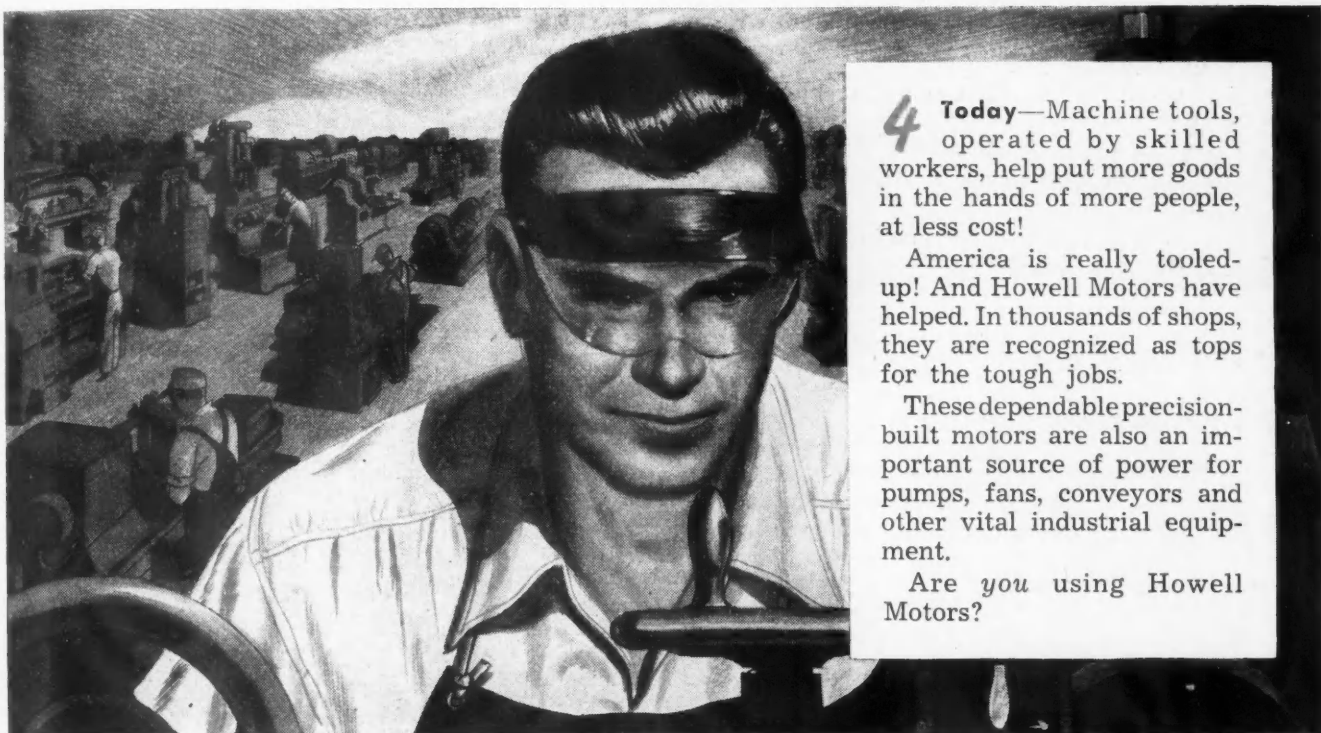


2 1855—Gradually, methods and techniques became more uniform, more exacting. Machine tools developed for one industry were tried successfully in others. But the real power behind machine tools, low-cost electricity, was still to come.



3 1915—Howell "Red Band" Electric Motors appeared. Applied to lathes, grinders, cutters, shapers and other machine tools, these rugged, industrial-type motors soon won wide acclaim for making good on hard jobs.

THEN, AMERICA TOOLED-UP!



4 Today—Machine tools, operated by skilled workers, help put more goods in the hands of more people, at less cost!

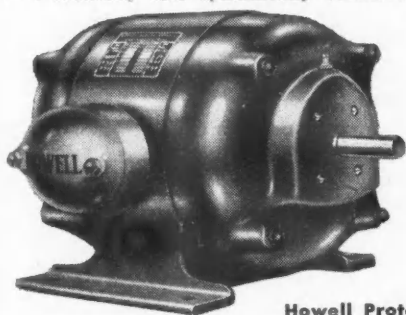
America is really tooled-up! And Howell Motors have helped. In thousands of shops, they are recognized as tops for the tough jobs.

These dependable precision-built motors are also an important source of power for pumps, fans, conveyors and other vital industrial equipment.

Are you using Howell Motors?

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.



Howell Protected Type Motor

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

microhoned*

for: 20% to 40% more production

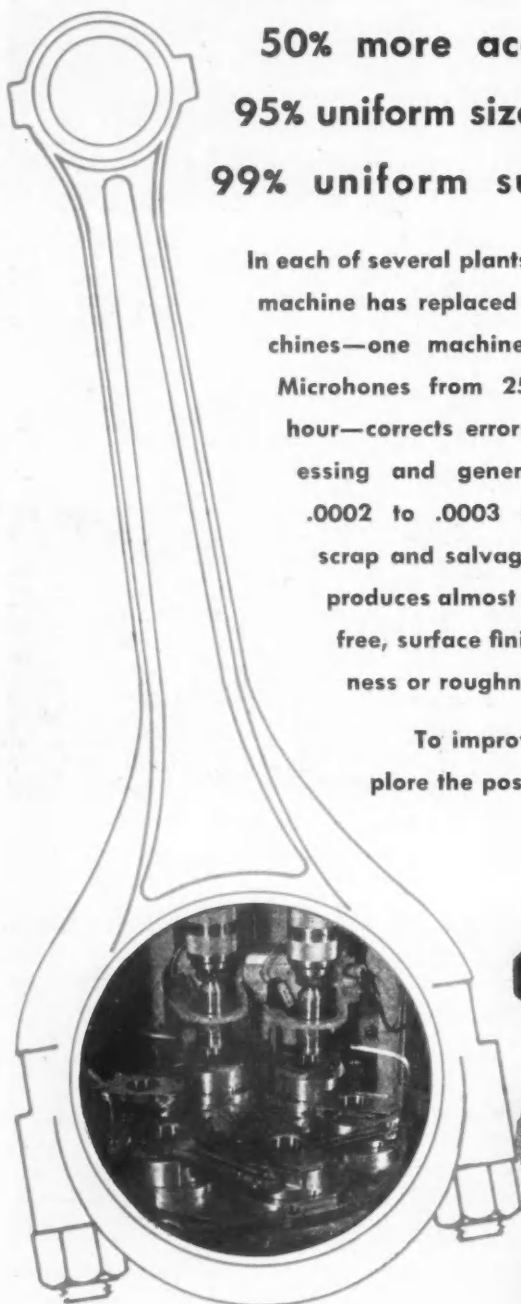
50% more accurate bearings

95% uniform size, fewer re-runs

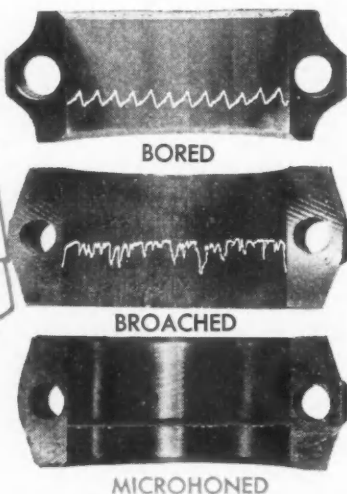
99% uniform surface finish

In each of several plants, one microhoning machine has replaced three grinding machines—one machine and one operator
Microhones from 250 to 400 rods per hour—corrects errors from previous processing and generates accuracy within .0002 to .0003 inch—reduces oversize scrap and salvage re-runs to within 5%—produces almost perfectly uniform, chatter-free, surface finish of any desired smoothness or roughness.

To improve your production, let's explore the possibilities now.



Six-station fixture for Microhoning two connecting rods simultaneously.



Comparison of Profilograph records of typical connecting rod machining operations.

* TRADEMARK REG. U. S. PAT. OFF.

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE, DETROIT 4, MICHIGAN



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Rockford, Ill.

55 George St.
Brantford, Ont.
Canada

Micromold Manufacturing Div.
Boston Post Road
Guilford, Conn.

Vauxhall Models

(Continued from page 41)

pushrod-operated valves. The aluminum pistons are tin plated. Lubrication is under pressure to steel backed main and connecting rod bearings, with positive supply to the cylinder bores. The water cooling system operates under a pressure of 3½ psi. A characteristic of the engine is the high torque at low engine speed to give maximum performance in high gear.

The four-cylinder engine has three main bearings. Its cooling system operates at atmospheric pressure with a centrifugal pump circulating the coolant. A conduit in the cylinder head directs water from the pump to the exhaust valve seats and guides. The overhead valves are operated by push rods.

A Borg & Beck clutch is fitted. The two models have the same three-speed, synchro-mesh transmission with control by a lever under the steering wheel and Spicer jointed open drive shaft. The rear axle ratios differ, being 4.125 for the six cylinder model and 4.625 for the four.

Both models have independent front wheel suspension, which is a Vauxhall development of the original Dubonnet. There is a tubular front axle on the extremities of which the suspension unit is mounted, this now operating through torsion bars. Semi-elliptic springs are fitted at the rear.

As on the earlier models, integral chassis-body construction is employed. The same body is used for both models. The front end, known in the factory as the "wheelbarrow," carries the power plant and the front suspension, and to this is welded the one-piece, four door, solid top, all-steel body. This has been stiffened by a new bulkhead back of the rear seats.

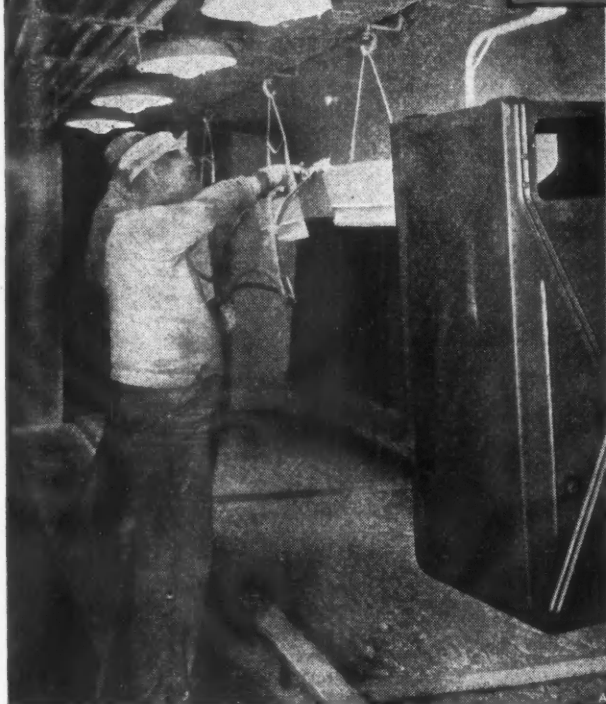
Styling is new. It embodies an alligator hood, chromium plated horizontal grille, sealed-beam headlights set in domed fenders, and an integral baggage compartment in which the spare wheel is laid flat. Provision is made for a heater and radio as extra equipment. The Stevenson jacking system is standard equipment. The jack is inserted in a special fitment under the body sill, where it is positively locked, and by operating the jack lever one side of the car is raised. Wheelbase is 97¾ in. and track 50 in. Weight of the six cylinder model is 2380 lb. A speed of 75 mph is claimed, with a mileage of 25-28 miles per imperial gallon. With the high axle ratio of 4.125 a speed of 50 mph is maintained at an engine speed of 2700 rpm.

READ

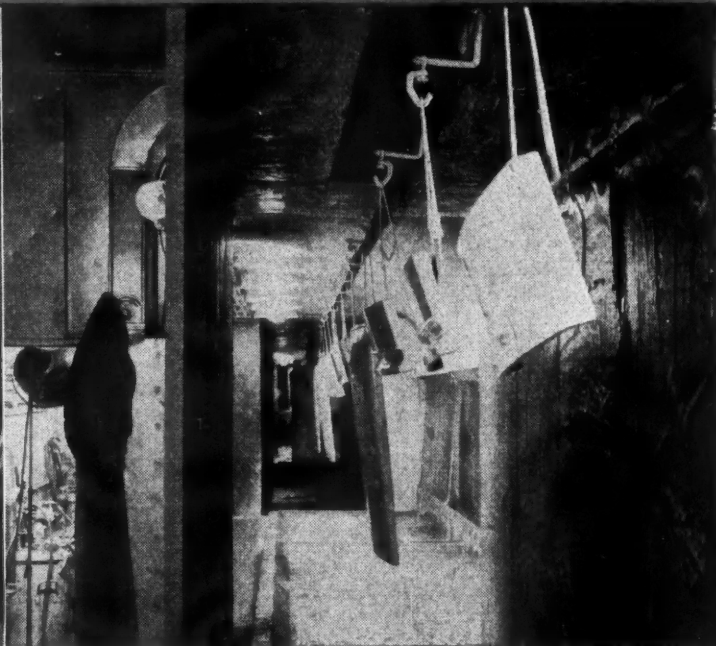
AUTOMOTIVE INDUSTRIES
to keep well informed

COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT



Above you see Refrigerator Parts receiving their Fine Synthetic Enamel Finish in Mahon Hydro-Filter Spray Booths, which are part of a Complete Mahon Finishing System.



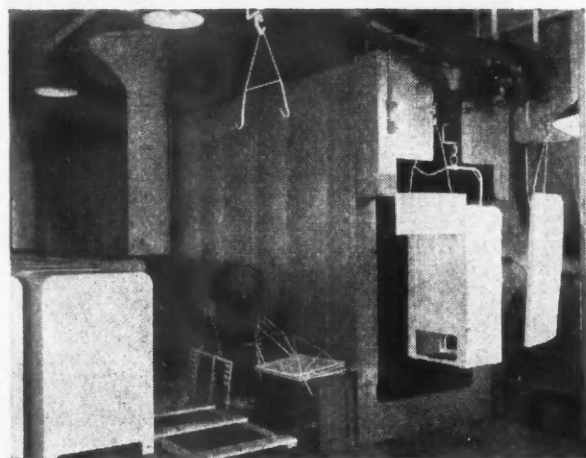
...Where Fine Finish is Imperative, it's Mahon Equipment

Here you see elements of a Complete Finishing System planned, engineered, built and installed by Mahon for one of the world's largest manufacturers of refrigerators. At point-of-sale, the finish on household appliances is of vital importance . . . as in the automobile industry, eye-appeal is an influencing factor in refrigerator sales. Now is the time to safeguard the future saleability of your product with the finest finish obtainable. You can rely on the Mahon organization to plan and engineer a Finishing System to do just that . . . because, Mahon's twenty-eight years of experience in this highly specialized field, enhanced by constant research and development, have endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon Insert in Sweet's Mechanical Industries File for complete information.

THE R. C. MAHON COMPANY

Home Office and Plant, Detroit 11, Mich. • Western Sales Division, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning Machines, Rust Proofing Machines, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Units, and Drying and Baking Ovens. Also Paint Reclaiming Units, Hydro-Foam Dust Collectors, and many other Units of Special Production Equipment.



Refrigerator Parts on a continuous conveyor line emerging from a Mahon Finish Baking Oven—part of the same Finishing System.

MAHON

Austin Adopts American Style

(Continued from page 45)

idler shaft is extended in a special housing which incorporates a pump delivering oil under pressure through the hollow reverse idler shaft to the main shaft bearings. Second, third and fourth years are synchromesh. The open drive shaft is Hardy Spicer, with needle bearings. Independent front suspension employs coil springs. Semi-elliptic springs are fitted at the rear, with zinc interleaves, double acting hydraulic shock absorbers, and an anti-roll torsion bar.

The A-90 Atlantic is offered as a four-passenger, all-steel convertible with electrically-operated top. It has a sloping alligator hood, horizontal radiator grille, with a fog light mounted separately in the center and below it a chrome-plated bumper. The front fenders extend rearwards, fading out at the height of the rear hub cap. Rear wheels are enclosed. Headlights are flushed into the fairings between fenders and hoods. The two doors have concealed hinges. The car is listed at

\$2,980, purchase tax being additional in England.

Built on the same 96-in. wheelbase chassis, the A-70 Hampshire has a four cylinder engine of 134.1 cu in. (3.125 by 4.375 in.) of the same general design as the larger one. It is presented as a four-door sedan, its body lines being similar to those of the Devon models. A sliding roof, concealed hinges, built-in heater and optional radio are some of the features. The Hampshire is listed at \$1,900, plus purchase tax.

The Countryman is a station wagon on the A-40 chassis, designed to carry six passengers or two persons and 1120 lb load. It is listed at \$1,660. The pickup truck has the same chassis with a two-seater cab and an open truck body selling at \$1,340.

Ingenious New Technical Methods

To Help You Increase Efficiency

Light Projector Increases Thread Grinding Production

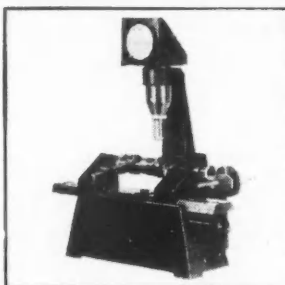
Production of thread grinding machines can now be increased through the use of a light projecting device called the Thread Pick-up Projector. The thread profile appears in a viewing screen, magnified 20 times, thereby permitting accurate visual adjustments.

In operation the Thread Pick-up Projector is placed alongside the thread grinding machine. A Dalzen Thread Grinder, Model No. 1, is shown above. While the machine is grinding the thread, the operator, using the Light Pick-up Projector, adjusts a "dog" on the next piece to be ground. When the "dog" and piece are then placed in the thread grinder the thread profile is automatically in location and ready for grinding immediately.

Even the most inexperienced personnel can "pick up the thread" using this instrument after only a few minutes demonstration. Grinding is also done more accurately and the viewer permits measurements of reliefs, notches, etc. to .0005 inch.

Efficiency of production can also be increased through the use of chewing gum. The act of chewing helps relieve nervous tension and seems to make the work go easier and faster. For these reasons, Wrigley's Spearmint Chewing Gum is being made available more and more by plant owners everywhere.

Complete details may be obtained from
Acme Scientific Company
1457 West Randolph, Chicago 7, Illinois



Thread Pick-up Projector



AC-75

CALENDAR

Conventions and Meetings

Commercial Motor Transport Show, London	Oct. 1-9
New England Materials Handling Exposition, Boston	Oct. 5-7
SAE Aeronautic & Aircraft Eng. Display, Los Angeles	Oct. 6-9
Paris Auto Show	Oct. 7-17
American Soc. Tool Engineers Convention, Los Angeles	Oct. 11-13
Inst. of Traffic Engineer Annual Mtg., Phila.	Oct. 11-13
Automotive Parts Builders' Assoc., St. Paul	Oct. 16-18
Nat'l. Metal Trades Assoc., New York City	Oct. 18-20
Nat'l. Safety Council Safety Congress & Expo., Chicago	Oct. 18-22
Automobile Old Timers Annual Mtg., New York City	Oct. 19
SAE Production Mtg., Cleveland	Oct. 21-22
Automobile Salon, Prague	Oct. 23-31
Amer. Welding Soc. Annual Mtg., Phila.	Oct. 25-29
Amer. Soc. for Metals Nat'l. Metal Congress & Expo., Phila.	Oct. 25-29
Amer. Soc. Body Engineers, Annual Convention, Detroit	Nov. 3-5
SAE Fuels & Lubricants Mtg., Tulsa	Nov. 4-5
Amer. Soc. for Quality Control Conference, Chicago	Nov. 4-5
London Passenger Car Show	Oct. 27-Nov. 6
Society of Motor Mfrs. International Motor Exhibition, London, Oct. 28-Nov. 6	
Nat'l. Tool & Die Mfg. Assoc. Annual Mtg., Milwaukee	Nov. 14-17
Soc. for Experimental Stress Analysis—Annual Mtg., New York	Dec. 2-4
Amer. Inst. Electrical Engrs. Conf. on Arc Welding, Detroit	Dec. 6-8
Automotive Service Industries Show, Navy Pier, Chicago	Dec. 6-10
Nat'l. Assoc. of Eng. & Boat Mfg., Motor Boat Show, New York City	Jan. 7-15
SAE Annual Mtg., Detroit	Jan. 10-14
Nat'l. Materials Handling Expos., Phila.	Jan. 10-14
Nat'l. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco	Jan. 24-27
Automotive Access. Mfrs. Annual Expos., New York City	Feb. 7-11
SAE Passenger Car, Body, Prod. Mtg., Detroit	Mar. 8-10
SAE Transportation Mtg., Cleveland	Mar. 28-30
SAE Aeronautic Mtg., New York City	Apr. 11-13
Salon International DeL' Aeronautique, Paris	April 29-May 15

Maybe
**BELLOWS
 ASSEMBLIES**
*can improve
 your product,
 too*

Are you looking for a better way to control temperature or pressure, seal shafts or valves against leakage, or transmit motion? If you are, it may pay you to look further into bellows assemblies. An easy, low-cost way to do it is to let our engineering department do the looking for you. That's what the users of the bellows assemblies shown above did, and they're

happy about it. Why not send *your* sketches and specifications to us for confidential analysis and recommendations? **CLIFFORD MANUFACTURING COMPANY, 563 E. FIRST ST., BOSTON 27, MASS.** Offices in New York, Detroit, Chicago, Los Angeles. *First with the Facts on Hydraulically-Formed Bellows.*

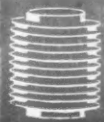
CLIFFORD



**HYDRAULICALLY - FORMED BELLOWS
 AND BELLOWS ASSEMBLIES**

**ALL-ALUMINUM OIL COOLERS
 FOR AIRCRAFT ENGINES**

Feather Weight



Instrument Bellows



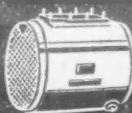
Aircraft Bellows Assembly



Steam Trap Bellows Assembly



Bellows Seal Assembly



All-Aluminum Cylindrical Oil Cooler



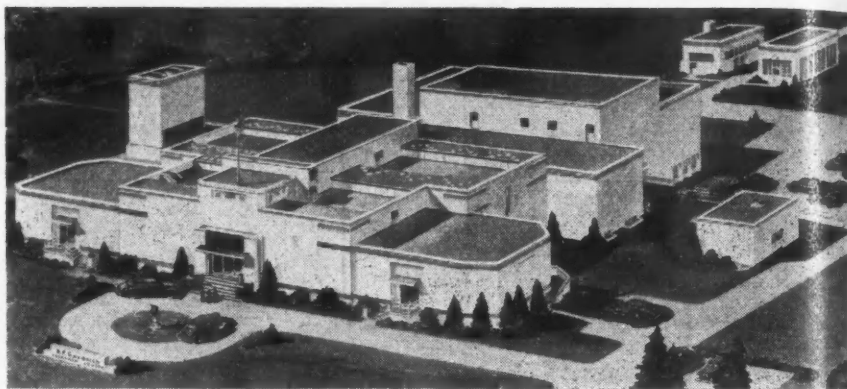
All-Aluminum Oval Oil Cooler

General News

(Continued from page 58)

U. S. Air Force Wins Approval of \$103 Million Request

Defense Secretary Forrestal has approved an USAF proposal to spend \$103.6 million for military aircraft. Approval by President Truman is expected soon. It is reported that the funds will be used for approximately 100 Lockheed F-80 jet fighters, 100 Republic F-84 Thunder jets and 13 Boeing B-50 bombers. It is believed that the expanded



RESEARCH COMPLETED

The B. F. Goodrich Co. recently completed the above Research Center which is located on a 261-acre tract near Brecksville, O. The Research Center includes six buildings and a powerhouse, and is considered one of the most complete industrial laboratories conducting fundamental and applied research.

aircraft program will have no appreciable effect on the supply of steel and other materials available to the automotive and other industries this year, since it will take several months to get the program functioning in anything like volume production.

Foy Resigns as Head of Jack & Heintz

Byron C. Foy has resigned as chairman of the board and president of Jack & Heintz Precision Industries, Inc. He will devote his time to other business interests, but will continue as a director. Kenneth G. Donald, previously general manager of the company, has been elected president. The office of chairman of the board was abandoned.

Continental Earnings Over \$2.5 Million

Continental Motors Corp. reports a net profit of \$2,536,129 for the nine months ending July 31. The profit represents earnings of Continental Motors Corp. and subsidiaries. Sales for the nine months were more than \$85.5 million.

Automotive Vehicle Exports Drop from Year Ago

Although total automobile and truck production this year will probably succeed last year's total, exports will drop sharply. It is expected that fewer than 450,000 units will be exported this year, compared with 512,333 shipped abroad during 1947.

GM President Appointed to Repairs Committee

C. E. Wilson, president of General Motors Corp., has been appointed to a (Turn to page 98, please)

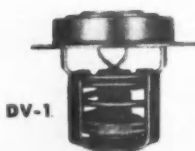
NEW-TYPE THERMOSTATS GIVE TOP PERFORMANCE

Introducing
THE DOLE "DV" LINE
Today's Most Modern Thermostats
for High Efficiency Cars and Trucks
Assures Accurate Control — Longer!



• These new-type units efficiently handle the extra loads placed on thermostats by increased water velocity which gives improved cooling in modern engines. They are not affected by pressure differentials. In sealed cooling systems, a "DV" Thermostat makes it possible to obtain adequate cooling with a high-set pressure cap and a smaller radiator.

Dole "DV" Thermostats are powered by a new type of element proved in use for many years in other thermostatically-controlled products. Their accurate control and longer life meet every need of the modern car. Higher heat thermostats for sealed cooling systems are an exclusive Dole feature—as is complete absence of "tapering" in valve seating pressure.



DV-1

Now used by leading automotive manufacturers

New "DV" Thermostats are a "companion line" to the now-famous Dole Bi-Metal Thermostats of which millions are serving satisfied customers as original equipment and replacement units.

- Power to handle high pump pressure.
- Not affected by pressure caps in sealed systems.
- Positive-acting thermal unit assures accurate control.
- Full seating pressure minimizes "leakage".
- Actuated by "solid expansion"—not vapor pressure.
- Rugged construction means longer life.

CONTROL WITH DOLE

THE DOLE VALVE COMPANY
1901-1941 Carroll Avenue • Chicago 12, Illinois
Los Angeles • Detroit • Philadelphia

**LIKE FAMOUS
WASHING-MACHINE MAKERS
YOU, TOO CAN
Mangle Costs
Stop Profit-Shrinkage
Starch up Sales**



with **AMERICAN PHILLIPS SCREWS**

LOSSES WASHED UP! Coin-slot washer-manufacturers can't afford to use slotted screws. For, as one maker says: "Slotted-driver gouges would cost us 50c to \$5.00 to refinish a painted panel." American Phillips Screws stop all that. And they start new savings — *of several seconds per screw* — that add up as high as 50%.

SALES STARCHED UP! Unburied American Phillips Screwheads mean that coin-laundry customers can't snag the clothes they put into machines. And these stay-tight screws mean, too, that washers are less often down for repair. Find out what double-edged production and sales-spurs American Phillips Screws can apply to *your* product. Write.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois St.

Detroit 2: 502 Stephenson Building

**4-WINGED DRIVER CAN'T SLIP OUT
OF PHILLIPS TAPERED RECESS**



AMERICAN PHILLIPS *Screws*



ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)



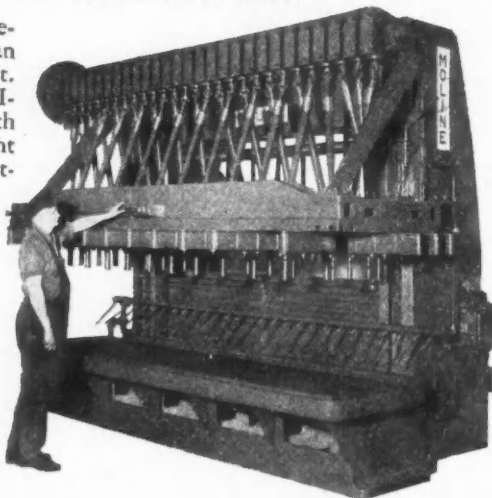
- ★ At greater Man-Hour SAVINGS
- ★ At higher rated EFFICIENCY
- ★ At finer, effortless PRECISION

A Moline Multiple Spindle Specially Designed Machine Tool can do your job better at less cost. Ruggedly built to fit your INDIVIDUAL requirements in such operations as Boring — Straight Line Drilling — Universal Adjustable Spindle Drilling — Honing — Tapping — Reaming — Counterboring — Special Milling — these machines are based on years of experience accumulated since 1901.

For your SPECIAL problem, go "Hole-Hog" and write us for any information you may need.

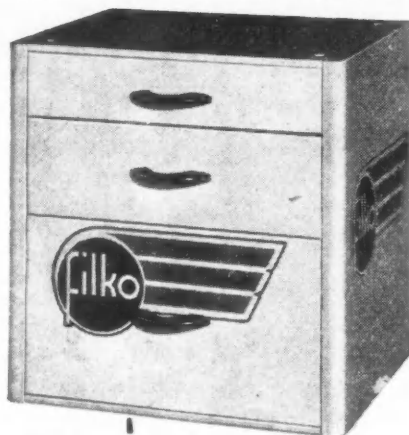


No. HU68
DRILLER



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100 20th Street Moline, Illinois

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MERCHANDISERS**
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Focus attention at the point of sale with Central's custom-built "spot" merchandisers. They identify your product, create a desire for it . . . and sell! Any size, shape or style can be created for you by our master designing department . . . creators of metal merchandisers and displays for top manufacturers for over 36 years.

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General News

(Continued from page 96)

group which will help the government decide which German industrial plants should be removed from the reparation lists to aid recovery. Paul G. Hoffman, ECA administrator and former president of Studebaker Corp., named Mr. Wilson and four other prominent industrialists to the committee which will be headed by George Humphrey, president of M. A. Hanna Co., Cleveland.

Spurt in Twin Coach Employment

Employment at the Twin Coach Co.'s plant in Buffalo, N. Y., has increased nearly 200 in the last few weeks to more than 550, and at least 200 more workers will be recalled in the next two months, a company executive has reported. All of a \$1.7 million order for 90 trolley coaches for San Francisco will be produced at the local plant. Current production is 1.5 buses daily, which will be stepped up as workers are added to the payroll, and the new parts and service department, now being placed in operation, is expected to do an annual business of more than \$1 million.

B-W's Pesco Div. Building New Plant

The Borg-Warner Corp.'s president, C. S. Davis, recently announced that a new \$2,650,000, 219,000-sq ft combined production plant and research laboratory would be built on a 35-acre site adjacent to Cleveland for the development and manufacture of high precision aircraft parts by the company's Pesco Products Div.

Wiesmyer to Supervise Ford Rouge Assembly

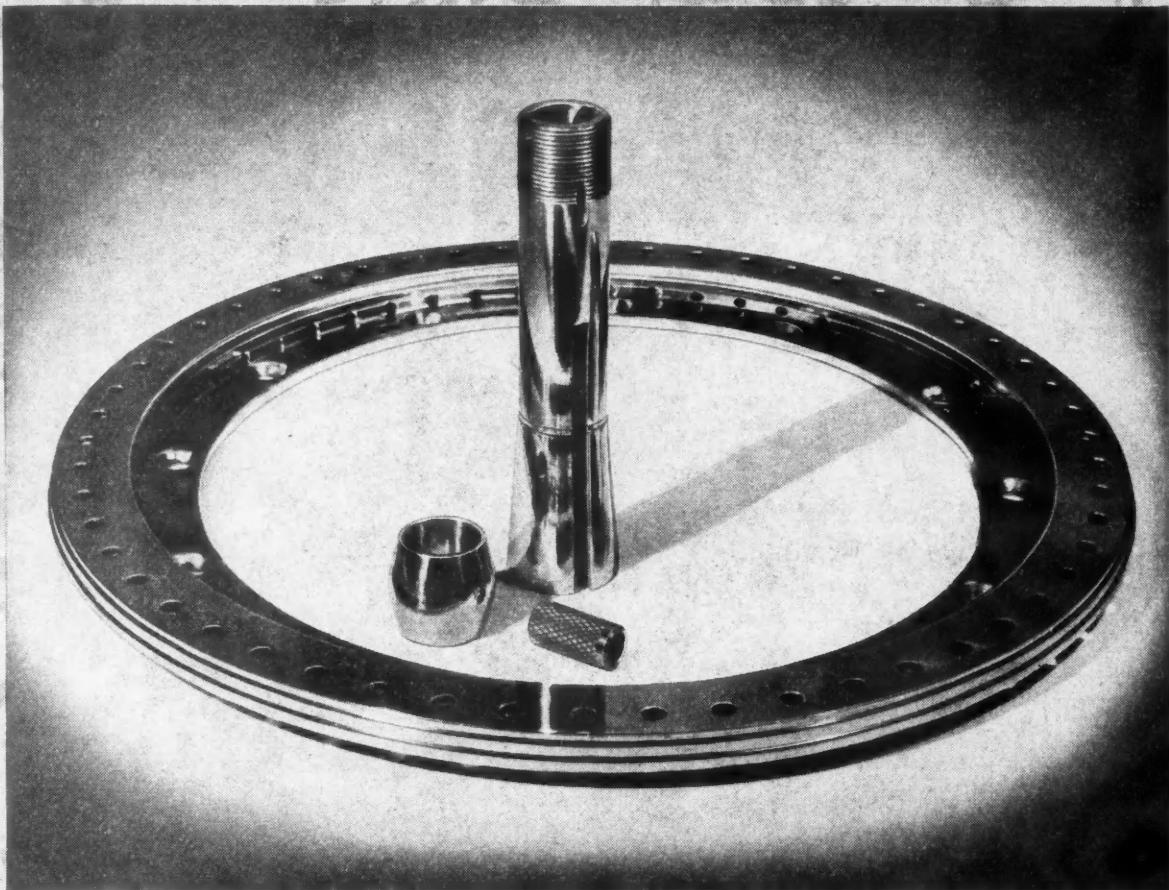
Transferred from general production operations, all Ford Motor Co. Rouge plant assembly operations and related activities are now under the jurisdiction of M. L. Wiesmyer, general manager, Ford assembly operations. Included in the facilities transferred are Ford and Mercury assembly lines, body, paint and trim operations and Dearborn branch delivery activities, together with all body assembly operations in the press steel shop and the driveway garage.

Aldus C. Higgins

Aldus C. Higgins, 75, chairman of the board, Norton Co., died in Worcester, Mass., on Sept. 10.

Allan Rae

Allan Rae, Toronto branch manager, A. Schrader's Son, Div., Scovill Manufacturing Co., died on August 28.



*I*f limited space is your problem, the sleeve bearing requires less radial room than any other type. Every month millions of Bunting Cast Bronze Bearings go into service where space is so limited that a sleeve bearing is the only type capable of meeting the requirement. Our engineers are at your service. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches In Principal Cities.

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40

PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

General Motors Corp., Chevrolet Motor Div.—The appointment of **W. F. Armstrong** as General Manager has been announced. Mr. Armstrong succeeds the late **Nicholas Dreystadt**.

General Motors Corp., GMC Truck & Coach Div.—**John E. Johnson** has been made General Truck Sales Manager and **Fred Falberg**, Factory Manager. Mr. Johnson succeeds **Joseph P. Little** who has been assigned to the staff of **M. D. Douglas**, General Manager. Mr. Falberg succeeds **Rodger J. Emmert**, who now directs the newly-created Facilities and Processes Staff.

Ford Motor Co., Lincoln-Mercury Div.—**John B. Millis** has been appointed Public Relations Director. **Ray H. Sullivan** has been appointed Asst. General Manager of Rouge automotive operations.

General Motors Corp., New Departure Div.—**Lorne F. Lavery**, formerly Manager of the Detroit Office, has been made Asst. General Sales Manager at Bristol, Conn.

Stewart-Warner Corp.—**James I. Minster** has been appointed Secretary.

Borg-Warner Corp., Norge. Div.—**Harry L. Spencer** is Director of Manufacturing of all five Norge plants. He succeeds **J. Nall Candler**, recently named Director of Manufacturing, who has been promoted to the position of Asst. General Manager of the entire division.

Pratt & Whitney Div., Niles-Bement-Pond Co.—**Samuel J. Matchett** has been appointed Manager of the Detroit office, as head of Machine Tool Sales in Michigan. He succeeds the late **H. William Kopf**.

The Electric Auto-Lite Co., Wire Div.—**H. R. Butts** has been appointed General Sales Manager.

Federal-Mogul Corp.—**Neil Moore** has been made Service Division Director.

Ex-Cello-O Corp.—**James K. Fulks**, Vice-President in Charge of Manufacturing, becomes a Director of the company. **John F. Miller** is Sales Manager of the Machine Tool and the Cutting Tool Divs. and **D. H. McIver**, the Sales Manager of Aircraft and Miscellaneous Parts Div.

United Aircraft Corp.—**Kenneth A. Koyen** has been appointed Asst. Director of Public Relations.

Republic Aviation Corp.—**Thomas A. Murphy** has joined the company as Manager of Subcontracts.

Lear, Inc.—**W. P. Lear** has been elected to the newly created post of Chair-

man of the Board and **Richard M. Mock** becomes President.

Fansteel Metallurgical Corp.—**Major General Joseph A. Teece** has been elected Vice-President of the company. **George F. Mueller** was elected Asst. Secretary.

Farrel-Birmingham Co., Inc.—**Carl F. ter Weele** has been appointed Export Manager.

E. W. Bliss Co., Toledo Machine & Tool Div.—**Paul S. Strecker** has been made Works Manager.

R. L. LeBlond Machine Tool Co.—**B. N. Brockman, Jr.** has become Advertising Manager, succeeding **Sidney R. Best**, resigned.

Ethyl Corp.—Three research and Development staff appointments announced are **Dr. Harold A. Beatty**, named to the newly created position of

Asst. Director of Research; **Dr. O. Edward Kurt** succeeds **Dr. Beatty** as Technical Asst. to the General Manager of Ethyl Laboratories; **Dr. George W. Beste** is the new Manager of the Development Section.

Morse Twist Drill & Machine Co.—The appointment of **J. C. Kuhn** as General Sales Manager has been announced. He succeeds **Mort Rainey**, resigned.

Caterpillar Tractor Co.—**Guy I. Swift** has been appointed Asst. Steel Fabrication and Assembly Factory Manager.

American Brake Shoe Co., Kellogg Div.—**Wm. H. Starbuck** has been appointed Asst. General Sales Manager.

Federal Machine & Welder Co.—**W. F. Longfield** has been made Sales Manager, Warco Press Div.

Henry Disston & Sons, Inc.—Appointment of **Wm. P. Gillespie** as Manager of its new Market Requirements Dept., has been announced.

Publications Available

(Continued from page 54)

and described in an 8-page booklet. Data for selection and installation have been included. The operation of the Grannan lubricator is clearly explained by means of cross-sectional drawings.

L-96—Motor Generator Sets

Hanson-Van Winkle-Munning Co.—A new catalog on low-voltage direct current motor-generator sets describes the company's product for such applications as electroplating, electro-cleaning, anodizing, Manodizing, electropolishing, metals refining and electrolytic production of chemicals. The bulletin lists and illustrates generators ranging in size from 300 amps to 40,000 amps at 6 volts to 40 volts. It describes in detail certain special construction features such as brushes, brush holders, bearings, control panels, etc. General specifications and efficiency curves for generators of various sizes are included.

L-97—Nickel Alloys

The International Nickel Co.—A revised list, "A", of current publications on Nickel Alloy Steels, Nickel Cast Irons, Nickel Brass and Bronzes and Nickel Plating is available. Publications offered cover the production, fabrications, properties and uses of nickel alloys for industrial applications and the productions, properties and use of nickel electrodeposits.

L-98—Copper Base Alloys

Fansteel Metallurgical Corp.—Five technical data bulletins, Nos. 601, 602, 603, 606 and 607, describe five copper base alloys for electrical and mechanical applications other than resistance welding. The bulletins give information on the special metal described, applications, advantages, properties, etc.

L-99—Spray Equipment Maintenance

Minnesota Mining and Mfg. Co.—Trouble shooting on spray equipment used in automotive undercoating is outlined in a new 20-page service manual, which also covers maintenance of the equipment and application instructions. The manual describes such problems as bleeding spray guns, pump failures, etc.

L-100—Induction Motors

Electric Machinery Mfg. Co.—Two new bulletins have been made available on Heavy-Duty squirrel-cage induction motors. Cutaway and sectional drawings show details of welded frame construction, protective design, modern bearings and multi-layer insulation. Bulletin 1300-PRD covers 2-pole and Bulletin 1300-PRD-189 covers 4 or more pole motors.

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